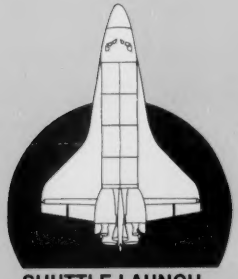
VOLUME 19 / NUMBER 5
MARCH 8, 1981
ACC. NOS. N81-13914 TO N81-14960

STAR
AN ABSTRACT JOURNAL

Scientific and Technical Aerospace Reports



PRODUCED BY THE
SCIENTIFIC AND TECHNICAL
INFORMATION
BRANCH

NASA

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

WHAT YOU CAN DO FOR *STAR*

All users of this abstract service are urged to forward reports to be considered for announcement in *STAR*. This will aid NASA in its efforts to provide the fullest possible coverage of all scientific and technical publications that might support aeronautics and space research and development. If you have prepared relevant reports (other than those that you will transmit to NASA, DoD, or DOE through the usual contract- or grant-reporting channels), please send them for consideration to the NASA Scientific and Technical Information Facility, P. O. Box 8757, B. W. I. Airport, Maryland 21240.

Reprints of journal articles, book chapters, and conference papers are also welcome. These will be considered for announcement in *STAR's* companion journal, *International Aerospace Abstracts*.

You may specify a particular source to be included in a report announcement if you wish; otherwise the report will be placed on public sale at the National Technical Information Service. Copyrighted publications will be announced but not distributed or sold.

PURCHASE OF *STAR*

The semimonthly issues and the cumulative index issues are available postpaid on subscription and in single copy from the Superintendent of Documents, United States Government Printing Office, Washington, D.C., 20402, United States of America.

Semimonthly issues...

Annual subscription rates: $60.00 domestic; $75.00 foreign. Price per single copy: $2.50 domestic; $3.15 foreign.

Cumulative index issues, semiannual and annual ...

Annual subscription rates for both: $25.00 domestic; $31.25 foreign. Price per single copy: semiannual $9.50 domestic, $11.90 foreign; annual $16.00 domestic, $20.00 foreign.

Domestic subscription rates...

Apply to the United States, Canada, Mexico, and all Central and South American countries, except as noted below.

Foreign subscription rates...

Apply to Argentina, Brazil, French Guiana, Guyana, Surinam, Belize, and all other countries throughout the world.

Payment should be by check, money order, or document coupons, and must accompany order. Remittances from foreign countries should be made by international money order or draft on an American bank, payable to the Superintendent of Documents, or by UNESCO book coupons.

PUBLISHED BY:

UNITED STATES GOVERNMENT
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
SCIENTIFIC AND TECHNICAL INFORMATION BRANCH
Scientific and Technical Aerospace Reports, Volume 19, is prepared by the NASA Scientific and Technical Information Facility operated for the National Aeronautics and Space Administration by PRC Data Services Company.

The Administrator of the National Aeronautics and Space Administration has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Agency. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through June 30, 1981.

US ISSN 0036-8741

INTRODUCTION

Scientific and Technical Aerospace Reports (STAR) is a major component of a comprehensive National Aeronautics and Space Administration information system covering aeronautics, space, and supporting disciplines. *STAR* is issued on the 8th and 23rd of each month and announces current publications of the following types:

- NASA, NASA contractor, and NASA grantee reports
- Reports issued by other U.S. Government agencies, domestic and foreign institutions, universities, and private firms
- Translations in report form
- NASA-owned patents and patent applications
- Dissertations and theses

Cumulative index volumes are published semiannually and annually.

Journal, book, and conference literature, cover-to-cover journal translations, and certain foreign dissertations are announced in a companion journal, *International Aerospace Abstracts (IAA)*, available on subscription from the American Institute of Aeronautics and Astronautics, Technical Information Service, 555 West 57th Street, 12th Floor, New York, New York 10019.

ON-GOING RESEARCH PROJECTS

By arrangement between NASA and the Smithsonian Science Information Exchange (SSIE), a separate section of information on aerospace-related *On-Going Research Projects* is inserted into each issue of *STAR*. The insert presents titles of active NASA grants and university contracts, summary portions of recently updated *NASA Research and Technology Objectives and Plans (RTOPs)*, and notices of non-NASA research projects that were funded in the most recent or current fiscal year. The latter are selected by SSIE. The project announcements in the insert are arranged by *STAR* divisions but are otherwise entirely separate from *STAR*. They are not indexed nor machine-searchable by NASA. Current and retrospective searches are available from SSIE, 1730 M Street, N.W., Washington, D.C. 20036.

SUBJECT SCOPE

Subject scope of *STAR*, *IAA*, and *On-Going Research Projects* includes all aspects of aeronautics and space research and development, supporting basic and applied research, and applications. Aerospace aspects of earth resources, energy development, conservation, oceanography, environmental protection, urban transportation, and other topics of high national priority are also covered.

OTHER NASA PUBLICATIONS

Other NASA publications and information services are described in the publication, *The NASA Scientific and Technical Information System ... and How to Use It*, available without charge from the NASA Scientific and Technical Information Facility, P. O. Box 8757, B. W. I. Airport, Maryland 21240.

HOW TO USE STAR SUBJECT CATEGORIES

STAR is categorized by 10 major subject divisions divided into 74 specific subject categories and one general category/division. The major subject divisions are listed in the Table of Contents, together with a note for each that defines its scope and provides any cross-references. For example:

AERONAUTICS

Includes aeronautics (general); aerodynamics; air transportation and safety; aircraft communications and navigation; aircraft design, testing and performance; aircraft instrumentation; aircraft propulsion and power; aircraft stability and control; and research and support facilities (air).

For related information see also *Astronautics*.

Each major division is further divided into as many as nine specific categories, which are identified by category numbers.

Abstracts in *STAR* are grouped by specific category, the categories appearing in sequential order. Category breaks in the abstract section are identified by the category number and title, and a scope note. Cross-references to other categories are provided as appropriate. For example:

02 AERODYNAMICS

Includes aerodynamics of bodies, combinations, wings, rotors, and control surfaces; and internal flow in ducts and turbomachinery.

For related information see also *34 Fluid Mechanics and Heat Transfer*.

CROSS-REFERENCES

Individual *STAR* abstracts are not ordinarily cross-referenced, except for certain conference reports or book translations that have had separate abstracts written for their component papers or chapters. Citations and abstracts of the components follow immediately after those of the parent document. When the subject content of a component differs sufficiently from the general content of the parent, a cross-reference citation also is printed at the end of the category to which it normally would have been assigned if it were independent.

DOCUMENTS ON MICROFICHE

Documents on microfiche[1] are designated by a pound sign (#) following the accession number. The pound sign is used without regard to the source or quality of the microfiche.

AVAILABILITIES

One or more sources from which a document announced in *STAR* is available to the public is given in each citation. The most commonly indicated sources and their acronyms or abbreviations are listed below. If the publication is available from a source other than those listed, the publisher and his address will be displayed on the availability line or in combination with the corporate source line.

(1) A microfiche is a transparent sheet of film, 105 by 148 mm in size, containing as many as 60 to 98 pages of information reduced to micro images (not to exceed 26:1 reduction).

Avail: NTIS. Sold by the National Technical Information Service. Prices for hard copy (HC) and microfiche (MF) are indicated by a price code following the letters HC or MF in the *STAR* citation. Current values for the price codes are given in the tables on page vii.

Initially distributed microfiche under the NTIS SRIM (Selected Research in Microfiche) is available at greatly reduced unit prices. For this service and for information concerning subscription to NASA printed reports, consult the NTIS Subscription Section, Springfield, Va. 22161.

NOTE ON ORDERING DOCUMENTS: When ordering NASA publications (those followed by the * symbol), use the N accession number. NASA patent applications (only the specifications are offered) should be ordered by the US-Patent-Appl-SN number. Non-NASA publications (no asterisk) should be ordered by the AD, PB, or other *report* number shown on the last line of the citation, not by the N accession number. It is also advisable to cite the title and other bibliographic identification.

Avail: SOD (or GPO). Sold by the Superintendent of Documents, U.S. Government Printing Office, in hard copy. The current price and order number are given following the availability line. (NTIS will fill microfiche requests, at the standard $3.50 price, for those documents identified by a # symbol.)

Avail: NASA Public Document Rooms. Documents so indicated may be examined at or purchased from the National Aeronautics and Space Administration, Public Documents Room (Room 126), 600 Independence Ave., S.W., Washington, D.C. 20546, or public document rooms located at each of the NASA research centers, the NASA Space Technology Laboratories, and the NASA Pasadena Office at the Jet Propulsion Laboratory.

Avail: DOE Depository Libraries. Organizations in U.S. cities and abroad that maintain collections of Department of Energy reports, usually in microfiche form, are listed in *Energy Research Abstracts*. Services available from the DOE and its depositories are described in a booklet, *DOE Technical Information Center - Its Functions and Services* (TID-4660), which may be obtained without charge from the DOE Technical Information Center.

Avail: Univ. Microfilms. Documents so indicated are dissertations selected from *Dissertation Abstracts* and are sold by University Microfilms as xerographic copy (HC) and microfilm. All requests should cite the author and the Order Number as they appear in the citation.

Avail: USGS. Originals of many reports from the U.S. Geological Survey, which may contain color illustrations, or otherwise may not have the quality of illustrations preserved in the microfiche or facsimile reproduction, may be examined by the public at the libraries of the USGS field offices whose addresses are listed in this Introduction. The libraries may be queried concerning the availability of specific documents and the possible utilization of local copying services, such as color reproduction.

Avail: HMSO. Publications of Her Majesty's Stationery Office are sold in the U.S. by Pendragon House, Inc. (PHI), Redwood City, California. The U.S. price (including a service and mailing charge) is given, or a conversion table may be obtained from PHI.

Avail: BLL (formerly NLL): British Library Lending Division, Boston Spa, Wetherby, Yorkshire, England. Photocopies available from this organization at the price shown. (If none is given, inquiry should be addressed to the BLL.)

Avail: Fachinformationszentrum, Karlsruhe. Sold by the Fachinformationszentrum Energie, Physik, Mathematik GMBH, Eggenstein Leopoldshafen, Federal Republic of Germany, at the price shown in deutschmarks (DM).

Avail: Issuing Activity, or Corporate Author, or no indication of availability. Inquiries as to the availability of these documents should be addressed to the organization shown in the citation as the corporate author of the document.

Avail: U.S. Patent and Trademark Office. Sold by Commissioner of Patents and Trademarks, U.S. Patent and Trademark Office, at the standard price of 50 cents each, postage free. (See discussion of patents and patent applications below.)

NASA PATENTS AND PATENT APPLICATIONS

Patents and patent applications owned by NASA are announced in *STAR* under appropriate subject categories and are referenced in the *STAR* indexes. In the Report/Accession Number Index, patents are indexed by the NASA Case Number (which appears in lieu of the report number in other indexes), the U.S. Patent Number, the U.S. Patent Application Serial Number, and the U.S. Patent Class. Patent applications for which patents have not yet been issued are indexed by the NASA Case Number and the U.S. Patent Application Serial Number.

NASA *patent application specifications* are sold in paper copy by the National Technical Information Service at price code A02 ($5.00 domestic; $10.00 foreign). Microfiche are sold at price code A01 ($3.50 domestic; $5.25 foreign). The US-Patent-Appl-SN- number should be used in ordering either paper copy or microfiche from NTIS. Printed copies of *patents* (which are not microfiched) are available for purchase at 50 cents per copy from:

Commissioner of Patents and Trademarks
U.S. Patent and Trademark Office
Washington, D.C. 20231

When ordering patents, the U.S. Patent Number should be used, and payment must be remitted in advance, preferably by money order or check payable to the Commissioner of Patents and Trademarks. Prepaid purchase coupons for ordering are also available from the Patent and Trademark Office. The patents and patent applications announced in *STAR* are owned by NASA and are available for royalty-free licensing. Requests for licensing terms and further information should be addressed to:

Assistant General Counsel for Patent Matters/Code GP-1
National Aeronautics and Space Administration
Washington, D.C. 20546

ELIGIBILITY AND REGISTRATION FOR NASA INFORMATION PRODUCTS AND SERVICES

A variety of services, in addition to the distribution of NASA scientific and technical reports and of *STAR* and its cumulative indexes, is available to organizations of the following types that have registered with NASA to receive specific services or products:

1. NASA offices, research centers, contractors, subcontractors, grantees, and consultants;

2. Other U.S. Government agencies and their contractors;
3. Libraries in the United States that have arrangements with NASA to maintain collections of NASA documents for public reference;
4. Other organizations in the United States having a need for NASA documents in work related to aeronautics and space research;
5. Organizations abroad that have established reciprocal document exchange arrangements with NASA.

Only the central service points or central points of document acquisition and control within qualified organizations are eligible to register for NASA products and services. Domestic organizations that may be eligible to receive various classes of NASA publications and services should address their requests for registration or for further information to:

NASA Scientific and Technical Information Facility
Attn.: Registration Activity
P.O. Box 8757
B.W.I. Airport, Maryland 21240

Organizations abroad should direct requests to the same address, but to the attention of: International Exchange Program.

AVAILABILITY OF STAR ABSTRACTS ON MICROFICHE

Microfiche of the abstract sections of this issue and other issues of *STAR* are available on annual subscription from NTIS, Attn: Subscriptions, 5285 Port Royal Road, Springfield, Virginia 22161. Annual subscription rates are $45.00 North America; $90.00 foreign. Abstract sections for previous years retroactive to 1964 are available at the current rates. Microfiche for individual *STAR* issue abstract sections are not available.

ADDRESSES OF ORGANIZATIONS

American Institute of Aeronautics
and Astronautics
Technical Information Service
555 West 57th Street, 12th Floor
New York, New York 10019

British Library Lending Division,
Boston Spa, Wetherby, Yorkshire,
England

Commissioner of Patents and
Trademarks
U.S. Patent and Trademark Office
Washington, D.C. 20231

Department of Energy
Technical Information Center
P.O. Box 62
Oak Ridge, Tennessee 37830

ESA-Information Retrieval Service
ESRIN
Via Galileo Galilei
00044 Frascati (Rome) Italy

Fachinformationszentrum Energie, Physik,
Mathematik GMBH
7514 Eggenstein Leopoldshafen
Federal Republic of Germany

Her Majesty's Stationery Office
P.O. Box 569, S.E. 1
London, England

NASA Scientific and Technical Information
Facility
P.O. Box 8757
B. W. I. Airport, Maryland 21240

National Aeronautics and Space
Administration
Scientific and Technical Information
Branch (NST-41)
Washington, D.C. 20546

National Technical Information Service
5285 Port Royal Road
Springfield, Virginia 22161

Pendragon House, Inc.
899 Broadway Avenue
Redwood City, California 94063

Superintendent of Documents
U.S. Government Printing Office
Washington, D.C. 20402

University Microfilms
A Xerox Company
300 North Zeeb Road
Ann Arbor, Michigan 48106

University Microfilms, Ltd.
Tylers Green
London, England

U.S. Geological Survey
1033 General Services Administration
Building
Washington, D.C. 20242

U.S. Geological Survey
601 E. Cedar Avenue
Flagstaff, Arizona 86002

U.S. Geological Survey
345 Middlefield Road
Menlo Park, California 94025

U.S. Geological Survey
Bldg. 25, Denver Federal Center
Denver, Colorado 80225

NTIS PRICE SCHEDULES

Schedule A

STANDARD PAPER COPY PRICE SCHEDULE

(Effective January 1, 1981)

Price Code	Page Range	North American Price	Foreign Price
A01	Microfiche	$ 3.50	$ 7.00
A02	001-025	5.00	10.00
A03	026-050	6.50	13.00
A04	051-075	8.00	16.00
A05	076-100	9.50	19.00
A06	101-125	11.00	22.00
A07	126-150	12.50	25.00
A08	151-175	14.00	28.00
A09	176-200	15.50	31.00
A10	201-225	17.00	34.00
A11	226-250	18.50	37.00
A12	251-275	20.00	40.00
A13	276-300	21.50	43.00
A14	301-325	23.00	46.00
A15	326-350	24.50	49.00
A16	351-375	26.00	52.00
A17	376-400	27.50	55.00
A18	401-425	29.00	58.00
A19	426-450	30.50	61.00
A20	451-475	32.00	64.00
A21	476-500	33.50	67.00
A22	501-525	35.00	70.00
A23	526-550	36.50	73.00
A24	551-575	38.00	76.00
A25	576-600	39.50	79.00
	601-up	-- 1/	-- 2/

A99 - Write for quote

1/ Add $1.50 for each additional 25 page increment or portion thereof for 601 pages up.

2/ Add $3.00 for each additional 25 page increment or portion thereof for 601 pages and more.

Schedule E

EXCEPTION PRICE SCHEDULE

Paper Copy & Microfiche

Price Code	North American Price	Foreign Price
E01	$ 5.50	$ 11.50
E02	6.50	13.50
E03	8.50	17.50
E04	10.50	21.50
E05	12.50	25.50
E06	14.50	29.50
E07	16.50	33.50
E08	18.50	37.50
E09	20.50	41.50
E10	22.50	45.50
E11	24.50	49.50
E12	27.50	55.50
E13	30.50	61.50
E14	33.50	67.50
E15	36.50	73.50
E16	39.50	79.50
E17	42.50	85.50
E18	45.50	91.50
E19	50.50	100.50
E20	60.50	121.50
E99 - Write for quote		
N01	28.00	40.00

VOLUME 19 NUMBER 5/MARCH 8, 1981

TABLE OF CONTENTS

AERONAUTICS

Includes aeronautics (general); aerodynamics; air transportation and safety; aircraft communications and navigation; aircraft design, testing and performance; aircraft instrumentation; aircraft propulsion and power; aircraft stability and control; and research and support facilities (air).

For related information see also *Astronautics*.

01 AERONAUTICS (GENERAL) 561

02 AERODYNAMICS 561

Includes aerodynamics of bodies, combinations, wings, rotors, and control surfaces; and internal flow in ducts and turbomachinery.

For related information see also *34 Fluid Mechanics and Heat Transfer*.

03 AIR TRANSPORTATION AND SAFETY 563

Includes passenger and cargo air transport operations; and aircraft accidents.

For related information see also *16 Space Transportation* and *85 Urban Technology and Transportation*.

04 AIRCRAFT COMMUNICATIONS AND NAVIGATION 565

Includes digital and voice communication with aircraft; air navigation systems (satellite and ground based); and air traffic control.

For related information see also *17 Spacecraft Communications, Command and Tracking* and *32 Communications*.

05 AIRCRAFT DESIGN, TESTING AND PERFORMANCE 566

Includes aircraft simulation technology.

For related information see also *18 Spacecraft Design, Testing and Performance* and *39 Structural Mechanics*.

06 AIRCRAFT INSTRUMENTATION 567

Includes cockpit and cabin display devices, and flight instruments.

For related information see also *19 Spacecraft Instrumentation* and *35 Instrumentation and Photography*.

07 AIRCRAFT PROPULSION AND POWER 568

Includes prime propulsion systems and systems components, e.g., gas turbine engines and compressors; and on-board auxiliary power plants for aircraft.

For related information see also *20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *44 Energy Production and Conversion*.

08 AIRCRAFT STABILITY AND CONTROL 568

Includes aircraft handling qualities; piloting; flight controls; and autopilots.

09 RESEARCH AND SUPPORT FACILITIES (AIR) 570

Includes airports, hangars and runways; aircraft repair and overhaul facilities; wind tunnels; shock tube facilities; and engine test blocks.

For related information see also *14 Ground Support Systems and Facilities (Space)*.

ASTRONAUTICS

Includes astronautics (general); astrodynamics; ground support systems and facilities (space); launch vehicles and space vehicles; space transportation; spacecraft communications, command and tracking; spacecraft design, testing and performance; spacecraft instrumentation; and spacecraft propulsion and power.

For related information see also *Aeronautics*.

12 ASTRONAUTICS (GENERAL) N.A.

For extraterrestrial exploration see *91 Lunar and Planetary Exploration*.

13 ASTRODYNAMICS 570

Includes powered and free-flight trajectories; and orbit and launching dynamics.

14 GROUND SUPPORT SYSTEMS AND FACILITIES (SPACE) N.A.

Includes launch complexes, research and production facilities; ground support equipment, e.g., mobile transporters; and simulators.

For related information see also *09 Research and Support Facilities (Air)*.

15 LAUNCH VEHICLES AND SPACE VEHICLES 571

Includes boosters; manned orbital laboratories; reusable vehicles; and space stations.

16 SPACE TRANSPORTATION 572

Includes passenger and cargo space transportation, e.g., shuttle operations; and rescue techniques.

For related information see also *03 Air Transportation and Safety* and *85 Urban Technology and Transportation*.

17 SPACECRAFT COMMUNICATIONS, COMMAND AND TRACKING N.A.

Includes telemetry; space communications networks; astronavigation; and radio blackout.

For related information see also *04 Aircraft Communications and Navigation* and *32 Communications*.

18 SPACECRAFT DESIGN, TESTING AND PERFORMANCE 573

Includes spacecraft thermal and environmental control; and attitude control.

For life support systems see *54 Man/System Technology and Life Support*. For related information see also *05 Aircraft Design, Testing and Performance* and *39 Structural Mechanics*.

19 SPACECRAFT INSTRUMENTATION 573
For related information see also *06 Aircraft Instrumentation* and *35 Instrumentation and Photography*.

20 SPACECRAFT PROPULSION AND POWER 574
Includes main propulsion systems and components, e.g., rocket engines; and spacecraft auxiliary power sources.
For related information see also *07 Aircraft Propulsion and Power, 28 Propellants and Fuels,* and *44 Energy Production and Conversion*.

CHEMISTRY AND MATERIALS

Includes chemistry and materials (general); composite materials; inorganic and physical chemistry; metallic materials; nonmetallic materials; and propellants and fuels.

23 CHEMISTRY AND MATERIALS (GENERAL) 574
Includes biochemistry and organic chemistry.

24 COMPOSITE MATERIALS 574
Includes laminates.

25 INORGANIC AND PHYSICAL CHEMISTRY 577
Includes chemical analysis, e.g., chromatography; combustion theory; electrochemistry; and photochemistry.
For related information see also *77 Thermodynamics and Statistical Physics*.

26 METALLIC MATERIALS 583
Includes physical, chemical, and mechanical properties of metals, e.g., corrosion; and metallurgy.

27 NONMETALLIC MATERIALS 585
Includes physical, chemical, and mechanical properties of plastics, elastomers, lubricants, polymers, textiles, adhesives, and ceramic materials.

28 PROPELLANTS AND FUELS 589
Includes rocket propellants, igniters, and oxidizers; storage and handling; and aircraft fuels.
For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power,* and *44 Energy Production and Conversion*.

ENGINEERING

Includes engineering (general); communications; electronics and electrical engineering; fluid mechanics and heat transfer; instrumentation and photography; lasers and masers; mechanical engineering; quality assurance and reliability; and structural mechanics.
For related information see also *Physics*.

31 ENGINEERING (GENERAL) 594
Includes vacuum technology; control engineering; display engineering; and cryogenics.

32 COMMUNICATIONS 600
Includes land and global communications; communications theory; and optical communications.
For related information see also *04 Aircraft Communications and Navigation* and *17 Spacecraft Communications, Command and Tracking*.

33 ELECTRONICS AND ELECTRICAL ENGINEERING 605
Includes test equipment and maintainability; components, e.g., tunnel diodes and transistors; microminiaturization; and integrated circuitry.
For related information see also *60 Computer Operations and Hardware* and *76 Solid-State Physics*.

34 FLUID MECHANICS AND HEAT TRANSFER 611
Includes boundary layers; hydrodynamics; fluidics; mass transfer; and ablation cooling.
For related information see also *02 Aerodynamics* and *77 Thermodynamics and Statistical Physics*.

35 INSTRUMENTATION AND PHOTOGRAPHY 614
Includes remote sensors; measuring instruments and gages; detectors; cameras and photographic supplies; and holography.
For aerial photography see *43 Earth Resources*. For related information see also *06 Aircraft Instrumentation* and *19 Spacecraft Instrumentation*.

36 LASERS AND MASERS 616
Includes parametric amplifiers.

37 MECHANICAL ENGINEERING 618
Includes auxiliary systems (non-power); machine elements and processes; and mechanical equipment.

38 QUALITY ASSURANCE AND RELIABILITY 621
Includes product sampling procedures and techniques; and quality control.

39 STRUCTURAL MECHANICS 622
Includes structural element design and weight analysis; fatigue; and thermal stress.
For applications see *05 Aircraft Design, Testing and Performance* and *18 Spacecraft Design, Testing and Performance*.

GEOSCIENCES

Includes geosciences (general); earth resources; energy production and conversion; environment pollution; geophysics; meteorology and climatology; and oceanography.
For related information see also *Space Sciences*.

42 GEOSCIENCES (GENERAL) 625

43 EARTH RESOURCES 626
Includes remote sensing of earth resources by aircraft and spacecraft; photogrammetry; and aerial photography.
For instrumentation see *35 Instrumentation and Photography*.

44 ENERGY PRODUCTION AND CONVERSION 628
Includes specific energy conversion systems, e.g., fuel cells and batteries; global sources of energy; fossil fuels; geophysical conversion; hydroelectric power; and wind power.
For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *85 Urban Technology and Transportation*.

45 ENVIRONMENT POLLUTION 644
Includes air, noise, thermal and water pollution; environment monitoring; and contamination control.

46 GEOPHYSICS 647
Includes aeronomy; upper and lower atmosphere studies; ionospheric and magnetospheric physics; and geomagnetism.
For space radiation see *93 Space Radiation*.

47 METEOROLOGY AND CLIMATOLOGY 651
Includes weather forecasting and modification.

48 OCEANOGRAPHY 656
Includes biological, dynamic and physical oceanography; and marine resources.

LIFE SCIENCES

Includes life sciences (general); aerospace medicine; behavioral sciences; man/system technology and life support; and planetary biology.

51 LIFE SCIENCES (GENERAL) 657
Includes genetics.

52 AEROSPACE MEDICINE 658
Includes physiological factors; biological effects of radiation; and weightlessness.

53 BEHAVIORAL SCIENCES 659
Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

54 MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT 659
Includes human engineering; biotechnology; and space suits and protective clothing.

55 PLANETARY BIOLOGY N.A.
Includes exobiology; and extraterrestrial life.

MATHEMATICAL AND COMPUTER SCIENCES

Includes mathematical and computer sciences (general); computer operations and hardware; computer programming and software; computer systems; cybernetics; numerical analysis; statistics and probability; systems analysis; and theoretical mathematics.

59 MATHEMATICAL AND COMPUTER SCIENCES (GENERAL) N.A.

60 COMPUTER OPERATIONS AND HARDWARE 660
Includes computer graphics and data processing.
For components see *33 Electronics and Electrical Engineering*.

61 COMPUTER PROGRAMMING AND SOFTWARE 662
Includes computer programs, routines, and algorithms.

62 COMPUTER SYSTEMS 666
Includes computer networks.

63 CYBERNETICS 667
Includes feedback and control theory.
For related information see also *54 Man/System Technology and Life Support*.

64 NUMERICAL ANALYSIS 668
Includes iteration, difference equations, and numerical approximation.

65 STATISTICS AND PROBABILITY 677
Includes data sampling and smoothing; Monte Carlo method; and stochastic processes.

66 SYSTEMS ANALYSIS 679
Includes mathematical modeling; network analysis; and operations research.

67 THEORETICAL MATHEMATICS 679
Includes topology and number theory.

PHYSICS

Includes physics (general); acoustics; atomic and molecular physics; nuclear and high-energy physics; optics; plasma physics; solid-state physics; and thermodynamics and statistical physics.
For related information see also *Engineering*.

70 PHYSICS (GENERAL) N.A.
For geophysics see *46 Geophysics*. For astrophysics see *90 Astrophysics*. For solar physics see *92 Solar Physics*.

71 ACOUSTICS 680
Includes sound generation, transmission, and attenuation.
For noise pollution see *45 Environment Pollution.*

72 ATOMIC AND MOLECULAR PHYSICS 682
Includes atomic structure and molecular spectra.

73 NUCLEAR AND HIGH-ENERGY PHYSICS 685
Includes elementary and nuclear particles, and reactor theory.
For space radiation see *93 Space Radiation.*

74 OPTICS 686
Includes light phenomena.

75 PLASMA PHYSICS 687
Includes magnetohydrodynamics and plasma fusion.
For ionospheric plasmas see *46 Geophysics.* For space plasmas see *90 Astrophysics.*

76 SOLID-STATE PHYSICS 695
Includes superconductivity.
For related information see also *33 Electronics and Electrical Engineering* and *36 Lasers and Masers.*

77 THERMODYNAMICS AND STATISTICAL PHYSICS 696
Includes quantum mechanics; and Bose and Fermi statistics.
For related information see also *25 Inorganic and Physical Chemistry* and *34 Fluid Mechanics and Heat Transfer.*

SOCIAL SCIENCES

Includes social sciences (general); administration and management; documentation and information science; economics and cost analysis; law and political science; and urban technology and transportation.

80 SOCIAL SCIENCES (GENERAL) 697
Includes educational matters.

81 ADMINISTRATION AND MANAGEMENT 698
Includes management planning and research.

82 DOCUMENTATION AND INFORMATION SCIENCE 698
Includes information storage and retrieval technology; micrography; and library science.
For computer documentation see *61 Computer Programming and Software.*

83 ECONOMICS AND COST ANALYSIS N.A.
Includes cost effectiveness studies.

84 LAW AND POLITICAL SCIENCE 699
Includes space law; international law; international cooperation; and patent policy.

85 URBAN TECHNOLOGY AND TRANSPORTATION 699
Includes applications of space technology to urban problems; technology transfer; technology assessment; and surface and mass transportation.
For related information see *03 Air Transportation and Safety, 16 Space Transportation,* and *44 Energy Production and Conversion.*

SPACE SCIENCES

Includes space sciences (general); astronomy; astrophysics; lunar and planetary exploration; solar physics; and space radiation.
For related information see also *Geosciences.*

88 SPACE SCIENCES (GENERAL) N.A.

89 ASTRONOMY 701
Includes radio and gamma-ray astronomy; celestial mechanics; and astrometry.

90 ASTROPHYSICS 701
Includes cosmology; and interstellar and interplanetary gases and dust.

91 LUNAR AND PLANETARY EXPLORATION N.A.
Includes planetology; and manned and unmanned flights.
For spacecraft design see *18 Spacecraft Design, Testing and Performance.* For space stations see *15 Launch Vehicles and Space Vehicles.*

92 SOLAR PHYSICS 702
Includes solar activity, solar flares, solar radiation and sunspots.

93 SPACE RADIATION N.A.
Includes cosmic radiation; and inner and outer earth's radiation belts.
For biological effects of radiation see *52 Aerospace Medicine.* For theory see *73 Nuclear and High-Energy Physics.*

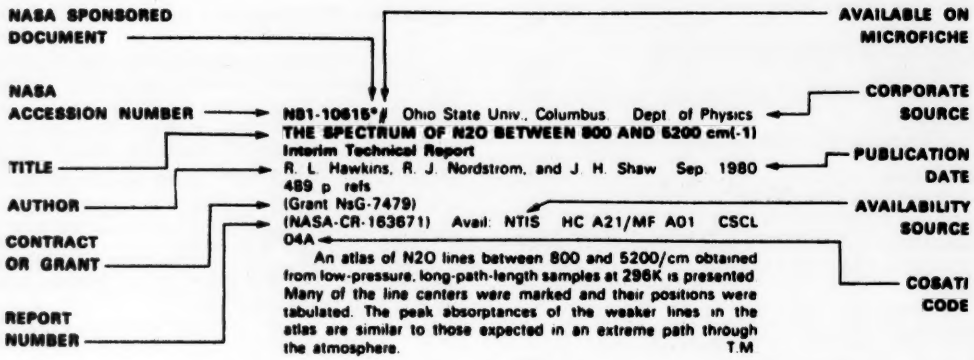
GENERAL

99 GENERAL 702

Note: N.A. means that no abstracts were assigned to this category for this issue.

SUBJECT INDEX I-1
PERSONAL AUTHOR INDEX I-67
CORPORATE SOURCE INDEX I-75
CONTRACT NUMBER INDEX I-91
REPORT/ACCESSION NUMBER INDEX I-95

TYPICAL CITATION AND ABSTRACT


NASA SPONSORED DOCUMENT
AVAILABLE ON MICROFICHE
NASA ACCESSION NUMBER
N81-10615*# Ohio State Univ., Columbus Dept. of Physics
CORPORATE SOURCE
THE SPECTRUM OF N2O BETWEEN 800 AND 5200 cm(-1)
TITLE
Interim Technical Report
PUBLICATION DATE
R. L. Hawkins, R. J. Nordstrom, and J. H. Shaw Sep. 1980
AUTHOR
489 p refs
(Grant NsG-7479)
AVAILABILITY SOURCE
CONTRACT OR GRANT
(NASA-CR-163671) Avail: NTIS HC A21/MF A01 CSCL 04A
COSATI CODE
REPORT NUMBER
An atlas of N2O lines between 800 and 5200/cm obtained from low-pressure, long-path-length samples at 296K is presented. Many of the line centers were marked and their positions were tabulated. The peak absorptances of the weaker lines in the atlas are similar to those expected in an extreme path through the atmosphere. T.M

ON-GOING RESEARCH PROJECTS

This is a listing of research projects - not publications

AERONAUTICS

Includes Aeronautics (general); Aerodynamics; Air Transportation and Safety; Aircraft Communications and Navigation; Aircraft Design, Testing, and Performance; Aircraft Instrumentation; Aircraft Propulsion and Power; Aircraft Stability and Control; and Research and Support Facilities (air). For Related Information See Also Astronautics.

1.0001, GRADUATE STUDENT TRAINING PROGRAM IN COMPUTATIONAL FLUID DYNAMICS

D.R. Chapman, Stanford University, School of Engineering, Dept. of Aeronautics & Astronautics, *Stanford, California* 94305 (NGT 05-020-801)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Aeronautics & Space Technology

1.0002, DEVELOPMENT OF A THREE-DIMENSIONAL UNSTEADY TRANSONIC FULL POTENTIAL ALGORITHM WITH ARBITRARY GEOMETRY CAPABILITY

T. Steger, Stanford University, School of Engineering, Dept. of Aeronautics & Astronautics, *Stanford, California* 94305 (NCC 2-97)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Ames Research Center

1.0003, HELICOPTER CONTROL SIMPLIFICATION

J.A. Stephens, U.S. Dept. of Defense, Army, Army Materiel Development & Readiness Command, Human Engineering Lab., *Aberdeen Proving Ground, Maryland* 21005 (DA0C4935)

To determine the feasibility of integrating and/or simplifying the characteristics of helicopter primary flight controls to achieve reduced complexity in regard to overall task loading and training of flight personnel.

The control of helicopters is characterized by two separate control devices, collective and cyclic. This requirement for two-handed operations has necessitated the location of secondary control and actuation devices on the cyclic and collective sticks and, to some extent, has placed limitation on cockpit configuration. HEL's MKII integrated control, developed and successfully test-flown under this work unit, has clearly demonstrated the feasibility of flying helicopters with one hand. Continuing simulator and flight research will address the impact of control integration on advanced cockpits utilizing fly-by-wire and the unbounded man-machine control options that surface in this emerging technology.

SUPPORTED BY U.S. Dept. of Defense, Army Materiel Development & Readiness Command, Human Engineering Lab.

1.0004, ALGORITHMS FOR COMPUTATIONAL FLUID DYNAMICS

S.S. Abarbanel, Massachusetts Inst. of Technology, School of Engineering, Dept. of Aeronautics & Astronautics, *77 Massachusetts Ave., Cambridge, Massachusetts* 02139 (NCC 1-45)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Langley Research Center

1.0005, AIR TRAFFIC CONTROL SIMULATION STUDY

R.W. Simpson, Massachusetts Inst. of Technology, School of Engineering, Dept. of Aeronautics & Astronautics, *77 Massachusetts Ave., Cambridge, Massachusetts* 02139 (NAS 2-10720)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Ames Research Center

1.0006, RIGID AIRFIELD PAVEMENT LOAD-DEFORMATION RESPONSE ANALYSIS

Y.T. Chou, U.S. Dept. of Defense, Army, Corps of Engineers, Waterways Experiment Station, *P.O. Box 631, Vicksburg, Mississippi* 39180 (DA0L8184)

To evaluate and select or develop appropriate mathematical expressions (models) that will accurately predict the response of total pavement systems when subjected to various loading inputs based upon the thickness and quality of materials comprising the pavement system. The predictive response model or models is/are essential to the development of improved pavement criteria which will consider the life-cycle of the pavement system.

Several mathematical models have been developed for predicting pavement response. From these available models, one will be selected, modified as necessary, and validated for use by means of available full-scale test data and performance data from actual airfields. Of concern will be development of methods to analyze joints, cracks, and other discontinuities in rigid pavements. The basic components for a finite element analysis will be assembled for modeling discontinuous composite (soil, concrete, steel) systems. Joint elements, interface elements, linkage elements (steel and concrete), and normal elements will be assembled in a code designed specifically for analyzing rigid pavements.

SUPPORTED BY U.S. Dept. of Defense, Corps of Engineers, Waterways Experiment Station

1.0007, AIRCRAFT POSITION MEASUREMENT USING LASER BEACON SYSTEMS

R.B. Miles, Princeton University, School of Engineering & Applied Sciences, Dept. of Mechanical & Aerospace Engineering, *Box 430, Princeton, New Jersey* 08540 (NCC 2-94)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Ames Research Center

1.0008, AIR-SHIP INTERFACE SYSTEMS TECHNOLOGY

F. Roggio, U.S. Dept. of Defense, Navy, Naval Air Engineering Center, *Lakehurst, New Jersey* 08733 (DN096101)

Develop digital computer-based technology to determine the needs and types of landing aid equipment of projected small ship platforms.

Describe the landing of a V/STOL aircraft through an airwake on a small moving ship as a multivariable system subject to random disturbances and develop digital computer-based technology to predict, assess, and optimize system performance. Develop mathematical models which represent the dynamics of the system elements, assemble them into Monte-Carlo digital simulations and develop an austere man-in-the-loop fixed-base simulator utilizing computer-generated imagery for scene display. Develop the software which will characterize a random

process, predict and optimize system performance and assess system sensitivty. The element models will include a set of aircraft dynamics, a flight control system, pilot response, an airwake, ship motion, visual landing aid stabilization, visual guidance information, and haul-down system dynamics.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Air Systems Command

1.0009, NAVTOLAND (NAVY VERTICAL TAKEOFF & LANDING) CONTROL/DISPLAY CAPABILITY

B. Eulrick, Calspan Corp., *1422 Genesses Ave., P.O. Box 235, Buffalo, New York* 14221 (DN881384; N62269-77-C-0561)

To analyze the tradeoffs between flight control and display complexity for V/STOL shipboard landings, and recommend optimum configurations. This contract supports work unit ZA601, Agency Accession No. DN681080.

Through literature searches and evaluation of flight-test data, develop a matrix of feasible and practicable control display configurations.

SUPPORTED BY U.S. Dept. of Defense, Naval Air Development Center, Aircraft & Crew Systems Tech Directorate

1.0010, DEVELOPMENT OF ADVANCED FLIGHT CONTROL ACTUATION SYSTEM CONCEPTS FOR NAVY AIRCRAFT

J. Leonard, Grumman Aerospace Corp., *S. Oyster Bay Rd., Bethpage, New York* 11714 (DN981062; N62269-78-C-0218)

The general objective of this task is to examine the broad spectrum of new flight control actuation concepts with respect to potential advantages and interrelationships with other aircraft systems. The resultant effect of these new concepts will be evaluated against projected aircraft mission and maintenance requirements. Recent advancements in onboard computers, electrical power equipment and solid-state processing components may offer advantages to new aircraft, especially with growing emphasis on combat survivability and simplified squadron maintenance. This contract supports work unit ZA601, Agency Accession No. DN 681080.

An investigation will be conducted to determine feasibility of integrating an all-electric rotary actuator in a proposed aircraft. The investigation will determine potential benefits and design concepts for mechanization of such a system. A follow-on program may include development of hardware, testing, and eventual flight demonstration.

SUPPORTED BY U.S. Dept. of Defense, Naval Air Development Center, Aircraft & Crew Systems Tech Directorate

1.0011, GRUMMAN DESIGN 698, FULL-SCALE WIND TUNNEL TEST

B. Rathke, Grumman Aerospace Corp., *S. Oyster Bay Rd., Bethpage, New York* 11714 (DN890278; N00019-80-C-0115)

To investigate the characteristics of medium disc-loading V/STOL aircraft using two propulsion units in a tilt-nacelle concept incorporating a unique exhaust vane control system. These flight characteristics will be evaluated on a powered full-scale model of the tilt-nacelle configuration throughout the transition flight envelope in the NASA Ames 40-by-80 wind tunnel and to evaluate the hover mode on the outside static test facility. The results of data from these tests will also be correlated with data from multiple small-scale models of the same configuration.

The full-scale model will be instrumented with force balances, pressure transducers, thermocouples, strain gauges, microphones, engine operating indicators and subjected to a wide range of test environments. Measurements will be taken for overall aircraft and propulsion system forces and moments, through a range of typical V/STOL flight conditions, as well as a number of uniquely V/STOL-related effects (such as tilt-nacelle inlet, nacelle aerodynamics, and exhaust gas recirculation when operating in-ground-effects). Also, tunnel and model conditions will be varied to simulate the transition from conventional to hover flight.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Air Systems Command

1.0012, INVESTIGATION OF THE AERODYNAMIC CHARACTERISTICS OF LEADING EDGE VORTEX FLAPS

F.R. DeJarnette, University of North Carolina, North Carolina State University, School of Engineering, Dept. of Mechanical & Aerospace Engineering, *Raleigh, North Carolina* 27607 (NCC 1-46)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Langley Research Center

1.0013, EXPERIMENTAL FLIGHT TEST EVALUATION OF J79 B/AL BLADES

R.J. Stabrylla, General Electric Co., *1 Jimson Rd., Cincinnati, Ohio* 45215 (DF459270; F33657-76-C-0608)

The objective of this effort is to develop and structurally qualify boron/aluminum J-79 first stage blades for engine qualification testing and evaluate their durability response during subsequent experimental flight test exposure in an RF4/J79-15 turbine engine.

The approach consists of seven tasks. The first two tasks are to develop B/Al blades having improved bond quality and reproducibility suitable for structural, engine qualification and flight-testing. The succeeding three tasks include design analysis and bench and structural FOD tests requisite for proceeding to engine qualification testing. The sixth task consists of the procurement of flight-test replacement blades. The seventh task includes component build-up, engine installation, delivery to WPAFB for endurance testing and evaluation of flight test evaluation blades.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Aero Propulsion Lab.

1.0014, BELLANCA SKYROCKET NATURAL LAMINAR FLOW FLIGHT RESEARCH

G.M. Gregorek, Ohio State University, Columbus Campus, School of Engineering, Dept. of Aeronautics & Astronautics, *190 N. Oval Dr., Columbus, Ohio* 43210 (NAS 1-16388)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Langley Research Center

1.0015, ADVANCED FIRE, EXPLOSION AND OVERHEAT DETECTION CONCEPTS FOR AIRCRAFT

D.G. Fox, U.S. Dept. of Defense, Air Force, Aero Propulsion Lab., *Wright Patterson A.F.B., Dayton, Ohio* 45433 (DF451630)

To select a multiplexing technique, pulse code modulation (PCM), pulse amplitude modulation (PAM), etc., and determine the most optimum method for using all available hazard sensors to inform crew members of the type, location and size of hazard and what should be done about it. To directly digitize and address transducers so that interrogation by the multiplexer can be direct and efficient. A flight-qualified system capable of providing rapid collated instructions and information to crew members is the goal of this program.

A method will be established and confirmed by experiments whereby the boundary layer behavior along the semi-porous blade surface can be calculated and the surface temperature variations predicted. The fluid dynamic and thermodynamic conditions surrounding a single moving blade will be studied and used to predict the peak temperatures of moving blades and the location of these peaks.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Aero Propulsion Lab.

1.0016, DESIGN AND ANALYSIS OF ADVANCED STRATEGIC AND TACTICAL MILITARY AIRCRAFT EXHAUST NOZZLE SYSTEMS

D.L. Bowers, U.S. Dept. of Defense, Air Force, Flight Dynamics Lab., *Wright Patterson A.F.B., Dayton, Ohio* 45433 (DF132000)

The broad problem area of advanced turbojet/turbofan-powered military tactical and strategic aircraft is the loss in range and performance attributed to airframe/exhaust nozzle flow interactions. The problems associated with the exhaust system integration have become quite complex for aircraft required to perform efficiently both subsonically and supersonically. The objective of this study is to develop new analytical and design techniques, and to improve available analytical methods that will predict the installed performance of jet exhaust nozzles on advanced strategic and tactical military aircraft.

Improve the calculation of installed exhaust nozzle performance of advanced military strategic and tactical aircraft by improving current and developing new analytical techniques for calculating nozzle internal and external flow fields. Existing experimental data and additional experimental data generated in the AFFDL Trisonic Gas Dynamics facility, AEDC PWT facilities, and NASA facilities will be utilized to develop empirical criteria for exhaust nozzle design.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Flight Dynamics Lab.

1.0017, CLOSED-LOOP FLYING QUALITIES ANALYSIS METHODS

F.L. George, U.S. Dept. of Defense, Air Force, Flight Dynamics Lab., *Wright Patterson A.F.B., Dayton, Ohio* 45433 (DF142270)

This work unit supports development of new flying qualities design criteria for military aircraft. The complex nature of advanced military aircraft demands that flying qualities analysis include the total closed-loop system consisting of airplane, control, displays, and pilot(s). This work unit will improve the capability for including consideration of the pilots' dynamics in realistic mission-oriented flying tasks. The ability to analyze and confidently predict flying qualities during the design of advanced military aircraft will improve mission effectiveness of the final product. Furthermore, it will reduce development costs by reducing the amount of experimental flying qualities testing needed and by eliminating potential design changes involved when flying qualities deficiencies aren't identified until the flight test program.

Several approaches to analytically accounting for pilot dynamics have been proposed and demonstrated using simplified tracking tasks. These results will be reviewed and refinements or extensions of existing methods needed for realistic flying qualities analysis will be identified. The most promising analytical techniques will be extended as appropriate and their validity for analyzing realistic mission-oriented flying tasks will be demonstrated. The pacing factor in this effort will be the availability of data to validate the revised or newly developed pilot-vehicle analysis methods.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Flight Dynamics Lab.

1.0018, LAMINAR BOUNDARY LAYER SEPARATION ON AN OGIVE FOREBODY IN SUBSONIC FLIGHT AND AT VERY HIGH ANGLES OF INCIDENCE

W.H. Lane, U.S. Dept. of Defense, Air Force, Flight Dynamics Lab., *Wright Patterson A.F.B., Dayton, Ohio* 45433 (DF144620)

This work unit supports studies of aerodynamic phenomena relating to stability and control of highly maneuverable aerospace vehicles. The particular problem area of concern is the adverse effect of extensive regions of separated flow on the stability and controllability of military aerospace vehicles. The technical objective of this work is the determination of the pattern and extent of boundary layer separation on a forebody (ogive) of wide design usage moving at high subsonic speed and at a very high angle of attack. The availability of accurate solutions of the boundary layer equations is a fundamental step in the formulation of parameterized algebraic equations for use in preliminary design studies and a necessary adjunct to time-consuming and expensive wind tunnel testing. The ability to predict the influence of forebody geometry on the pattern and position of boundary layer separation will permit an assessment of significant parameters influencing the aerodynamic design of military aerospace vehicles and their ability to perform specialized missions.

The boundary layer and other relevant flow field equations have been written in terms of a streamline coordinate system appropriate for a specific geometrical shape and Mach number regime. Numerical solution of the pertinent equations will be attempted by a suitable explicit or implicit finite difference method. Formulating or adapting an existing computer code to facilitate numerical solution of the appropriate system of partial differential equations may prove to be an unavoidable hinderance to early completion of the work.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Flight Dynamics Lab.

1.0019, FLIGHT CONTROL SYSTEM DEVELOPMENT CRITERIA

T.D. Lewis, U.S. Dept. of Defense, Air Force, Flight Dynamics Lab., *Wright Patterson A.F.B., Dayton, Ohio* 45433 (DF138620)

Analysis tools to predict aircraft flight control/weapon system performance and cost estimates are inadequate to be applied early in the design cycle. Also, newly emerging flight control technologies require a firm data base and experience factors to be included in military specifications. The objectives of this effort are to (1) refine and consolidate the flight control system (FCS) development analysis, evaluation, and life cycle cost (LCC) prediction techniques, and (2) develop, refine, and revise military specifications for flight control system design, development, test, and evaluation. FCS specification revisions will incorporate newly emerging technology and aid in reducing FCS design and test time. Consolidation and refinement of analysis techniques will provide criteria for realistic system performance and cost estimates early in the design cycle.

Digital flight control system experience will be broadened through support of the A-7 digital multimode FCS test aircraft while in use at the test pilots school, through experience gained on the digital flight control system ADP, and through interaction with work on related programs performed by other agencies for application and incorporation into MIL-F-9490D. Development of a new specification for servo-actuators will continue. Review and update of MIL-V-27162, servo-valve specification, will be initiated. Review, refinement, and consolidation of FCS analysis programs such as TAWDS, DIGIKON, MAPS, and FCS LCC prediction will be conducted as applicable. Coordination with AFLC ALC's and the USAF Safety Center will be conducted along with review of FCS safety, survivability, reliability, and maintainability data to establish criteria for future FCS programs and specification update.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Flight Dynamics Lab.

1.0020, REVISION OF FLYING QUALITIES SPECIFICATION MIL-F-8785B

D.J. Moorhouse, U.S. Dept. of Defense, Air Force, Flight Dynamics Lab., *Wright Patterson A.F.B., Dayton, Ohio* 45433 (DF143630)

This work unit supports an update of the military flying qualities requirements contained in MIL-F-8785B, flying qualities of piloted airplanes. The problem is that these requirements are not applicable to many advanced flight control concepts; the requirements must be updated to correct these deficiencies. The objectives are to 1) complete a current revision of MIL-F-8785B, and 2) continue the revisions and reformat into a prime-standard and handbook. The payoff from this effort will be a consistent set of design and flight test flying qualities requirements that will allow new and advanced technologies to be incorporated into new aircraft system developments, in order to ensure mission success without penalties caused by over-design.

A current revision effort will be coordinated and finalized as a conversion to MIL-F-8785C. Comments received from this process will be used to plan the development of the prime-standard and the handbook. In addition, new flying qualities data from flight-test, simulation or analysis will be gathered. These data will be compared with existing or proposed criteria.

Existing flying qualities criteria will be validated or modified, or new ones will be formulated, for incorporation in the handbook.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Flight Dynamics Lab.

1.0021, CLOSED ENVIRONMENTAL CONTROL SYSTEM EVALUATION

R.W. Watts, U.S. Dept. of Defense, Air Force, Flight Dynamics Lab., *Wright Patterson A.F.B., Dayton, Ohio* 45433 (DF141540)

Future high performance military aircraft will encounter severe mission penalties if conventional approaches to the environmental control system (ECS) are used. Reduction of significant mission take-off-gross-weight (TOGW) penalties is possible through development of a closed-loop ECS. This ECS concept can reduce engine bleed air and ram air penalties by approximately 80 percent. Additional reliability and cost savings are attainable through new designs. The objective of this effort is to develop criteria for the most important elements of the closed-loop ECS (the air cycle machine (ACM), drive system, expansion devices).

Test those elements of a closed-loop ECS that are needed to improve the life cycle cost of advanced aircraft. These elements would include the ROVAC models 607 and 608 ACM, a closed-loop hydraulic drive, and various expansion and refrigeration machines which will enhance closed ECS performance. Initiate analysis programs to determine the stability and control characteristics of various closed-loop ECS configurations. For example, a model shall be constructed on the 'easy' dynamics program to study closed-loop arrangements under dynamic inputs.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Flight Dynamics Lab.

1.0022, DETERMINE LOADING BEHAVIOR OF MK7-1 AND MK7-2 ARRESTING GEAR

R.S. Ebers, LTV Corp., Vought Systems Division, *P.O. Box 5907, Dallas, Texas* 75222 (DN590025; N00019-75-C-0237)

Perform a study to determine the characteristic loading behavior of the MK7-1 and MK7-2 arresting gear by analysis of airplane test data.

The approach will consist of data gathering and data analysis to establish optimum characteristics for loading behavior of the arresting gear.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Air Systems Command

1.0023, HT PP 78-31 - MINI-RPV PROPULSION SYSTEM TESTS AND EVALUATION

E.T. Johnson, U.S. Dept. of Defense, Army, Aviation Research & Development Command, Applied Technology Lab., *Fort Eustis, Newport News, Virginia* 23604 (DA0E3831)

This house task has two major objectives: (1) government evaluation of 20 hp mini-rpv engines to determine their limitation and capabilities through component system tests, and (2) tests of propulsion system components to define an integrated propulsion system for future mini-rpv's.

Conduct performance (dynamometer) and endurance (propeller) testing of three hp mini-rpv engines currently under development. Test individual components/systems (engine/alternaters, propellers, fuels, oils) to define their mechanical limitations and performance capabilities. Obtain potential propulsion system components/systems (ducted propellers, ground-adjustable propellers, engines) and run tests to evaluate performance and durability to assist in defining a total integrated propulsion system package.

SUPPORTED BY U.S. Dept. of Defense, Aviation Research & Development Command, Research & Technology Lab.

1.0024, INTEGRATED ENGINE EXHAUST NOZZLE

J. Petit, Boeing Co., *7555 E. Marginal Way S., Seattle, Washington* 98124 (DN796806; N00140-76-C-1441)

To establish the performance of a 'two-dimensional' integrated engine nozzle reverser and vectoring system for an attack aircraft.

A study will be conducted to determine the thrust-minus-drag characteristics of the 2-d airframe integrated nozzle (AIN) concept on an F-18 wind tunnel model. Four advanced nozzle designs will be evaluated on a U.S. Navy-owned, 10% scale, F-18 model. The nozzle types are the F-18 C-D baseline, the Boeing AIN and the GE ADEN and ALBEN systems. The overall program is being jointly funded by the USN-NAPC and NASA, LERC.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Air Propulsion Test Center

ASTRONAUTICS

Includes Astronautics (general); Astrodynamics; Ground Support Systems and Facilities (space); Launch Vehicles and Space Vehicles; Space Transportation; Spacecraft Communications; Command and Tracking; Spacecraft Design, Testing, and Performance; Spacecraft Instrumentation; and Spacecraft Propulsion and Power. For Related Information See Also Aeronautics.

2.0001, RESEARCH STUDY - SOLID ROCKET MOTOR INTERNAL BALLISTIC PERFORMANCE VARIATIONS

W.A. Foster, Auburn University, School of Engineering, Dept. of Aerospace Engineering, *Auburn, Alabama* 36830 (NAS 8-33886)

SUPPORTED BY U.S. National Aeronautics & Space Admin., George C. Marshall Space Flight Center

CHEMISTRY AND MATERIALS

Includes Chemistry and Materials (general); Composite Materials; Inorganic and Physical Chemistry; Metallic Materials; Nonmetallic Materials; and Propellants and Fuels.

3.0001, LOW EXHAUST SIGNATURE PROPULSION

W.W. Wharton, U.S. Dept. of Defense, Army, Missile Research & Development Command, Technology Lab., *Redstone Arsenal, Huntsville, Alabama* 35809 (DA0F1081)

To develop propellants with low smoke content and considerably improved physical properties over current low smoke propellants. Emphasis will be on extending the burning rate range and improving physical properties in the low temperature region.

The approach is to investigate cross-linked double-base propellants and to investigate various new oxidizers, binders, and burning rate modifiers that are becoming available.

SUPPORTED BY U.S. Dept. of Defense, Missile Research & Development Command, Propulsion Directorate

3.0002, NEW POLYMERS FOR LOW-GRAVITY PURIFICATION OF CELLS BY PARTITIONING

J.M. Harris, University of Alabama in Huntsville, School of Science & Engineering, Dept. of Chemistry, *Huntsville, Alabama* 35807 (NAS 8-33978)

SUPPORTED BY U.S. National Aeronautics & Space Admin., George C. Marshall Space Flight Center

3.0003, CONDUCTIVITY AND CHARGE STORAGE PROPERTIES OF INSULATING MATERIALS

J. Wilkenfeld, International Research & Technology Corp., *P.O. Box 80817, San Diego, California* 92138 (DF903240; F19628-77-C-0245)

AF function - surveillance and communications. Deficiency -communications satellites (DSCS) have displayed erratic electronic behavior soon after being placed in orbit. It has been determined that at least some of the observed malfunctions could be due to electrical breakdown in insulating materials caused by the effects of electrons present in the region of satellite orbits. Objective is to obtain theoretical and/or empirical models of charge storage in satellite materials exposed to space radiation environments. How research contributes - the information to be

obtained will contribute to improved satellite designs that minimize malfunctions due to space radiation-induced electrical breakdown.

Previously obtained empirical data on the charge storage properties of insulation will be used to refine existing models or develop new theoretical models that can be used to compute the responses of these materials to a synchronous orbit space environment. Additional experimental measurements will be performed as needed to refine or test the models.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Rome Air Development Center

3.0004, AMBIENT CURING COMPOSITE REPAIR MATERIALS

D.J. Crabtree, Northrop Corp., Aircraft Division, *3901 W. Broadway, Hawthorne, California* 90250 (DN081475; N62269-79-C-0224)

To develop an inexpensive, rapid method of effecting repair of graphite/epoxy composite components in the fleet. This contract supports work unit ZM 501, Accession DN 681081.

Select a candidate polymeric resin system to be used in concert with continuous graphite fibers to effect a repair of graphite/epoxy aircraft components. The properties of the repair must match those or show potential for matching the unaffected AS/35016 material on a wet (220 deg. F and 250 deg. F) and dry R.T. and 250 deg. F 'b' allowable statistical basis. Quality assurance procedures should guarantee the presence of chemical constituents in the repair material on a reproducible basis and should be documented in progress and final reports.

SUPPORTED BY U.S. Dept. of Defense, Naval Air Development Center, Aircraft & Crew Systems Tech Directorate

3.0005, NAVY VEHICLE DESIGN AND CONSTRUCTION - HIGH STRENGTH HIGH STIFFNESS PARTICULATE COMPOSITE MATERIALS

O.D. Sherby, Stanford University, School of Engineering, Dept. of Materials Science, *Stanford, California* 94305 (DN723740; N00014-75-C-0662)

This research is aimed at structural materials with improved strength and stiffness for use in jet engines, landing gears, and airframes. Under investigation are the effects of processing variables on the stucture and mechanical properties of particulate composites.

Particulate composites of steel powders will be prepared and tested. Variables will include volume percent of high carbon steel and low carbon steel powders, carbon content and size of the particles, and heat treating parameters. Superplastic behavior and mechanical properties will be evaluated. A thermomechanical processing approach will be employed to produce a refined microstructure in white cast iron. Also, rapidly solifified cast iron powder will be hot pressed and worked. Both materials will be examined for their superplastic behavior.

SUPPORTED BY U.S. Dept. of Defense, Navy, Office of Naval Research

3.0006, CONFIGURATION-DEPENDENT PROPERTIES OF POLYMERIC CHAINS

P.J. Flory, Stanford University, School of Humanities & Sciences, Dept. of Chemistry, *Stanford, California* 94305 (DMR80-06624)

This research deals with the conformation and spatial configurations of polymer chains, i.e., with the shape that the thin very long molecules can assume as a result of multiple bond rotations. More specifically, it is concerned with polymer chains in dilute solutions where the chains are in isolation from one another, and with chains in the amorphous state, in crystallites, at the amorphous-crystalline interface, and in membranes. Several problems will be attacked: 1) Calculations of conformational energies. 2) Theoretical treatment and experimental verification of polymer chain conformation by neutron and X-ray scattering at intermediate angles (at scattering vectors in the range 0.04-1.0 angstroms). These experiments will make use of the Oak Ridge National Laboratory facilities. 3) Optical anisotropies of chain molecules, with emphasis on depolarized Rayleigh scattering, electric birefringence, and strain birefringence. 4) Molecular morphology of semicrystalline polymers and mechanisms of crystallization, with emphasis on how the long chains accommodate themselves into the crystallites. 5) Theory of polymer chains in interphase layers, e.g., in regions separating crystal lamellae from amorphous disordered material, or in biological membranes. 6) Structure and topology of polymeric networks, particularly as related to rubber elasticity. Analyses of this type are essential to an understanding of the behavior of polymers as materials.

This is a renewal of NSF Grant DMR76-20638 and is the first year of a five-year continuing grant.

SUPPORTED BY U.S. National Science Foundation, Directorate for Mathematical & Physical Sciences, Div. of Materials Research

3.0007, DAMAGE AND EROSION OF MATERIALS

A.G. Evans, University of California, Berkeley Campus, Graduate School, *2200 University Ave., Berkeley, California* 94720 (DN975217; N00014-79-C-0159)

Carbon-carbon composites (c/c) are prime candidates for use in RV nose cones and launch vehicle rocket nozzles. Ceramics such as Si3N4 are candidate materials for missile engines and domes. The use of these materials in the above applications requires microstructures that are resistant to erosion (material removal). This study has the following three objectives: (1) characterize the deformation processes leading to erosion, (2) determine the microstructural dependence of these deformation processes, (3) develop models of the erosion process.

Carbon-carbon and model (glass fiber-epoxy) materials will be loaded in compression. The deformation processes, such as fiber kink initiation, at defects will be characterized. Displacements at the defects will be analyzed and from these displacements the stresses in the fibers calculated. From these calculations strength/probability models for the fibers will be evaluated. Ceramic materials will be impacted with SiC or quartz particles and indented using standard techniques (Knoop). The resulting material damage will be characterized. The results will be modeled using elastic/plastic stress analysis and fracture mechanics formulations.

SUPPORTED BY U.S. Dept. of Defense, Navy, Office of Naval Research

3.0008, THE STRUCTURE OF LIQUID AND AMORPHOUS METALLIC ALLOYS AND THE STRUCTURAL RELAXATION OF METALLIC GLASSES

C.N. Wagner, University of California, Los Angeles Campus, School of Engineering & Applied Science, Dept. of Materials, *405 Hilgard Ave., Los Angeles, California* 90024 (DMR80-07939)

This is an investigation of the structure and structural relaxation of binary (and quasi-binary) amorphous alloys of Ti with Cu and Ni, and Zr(Hf) with Cu, Ni, and Mn in an effort to increase our knowledge of the fundamental nature of the atomic structure, i.e., the topological and chemical short-range order, and defects of the metallic amorphous state, and to compare it with the corresponding liquid state. Corollary goals are: 1) to correlate the foregoing with variations in critical properties resulting from primary fabrication and post-quenching annealing, and 2) ultimately to determine to what degree it may be possible to control and usefully modify physical properties by the annealing treatments. X-ray and neutron large-angle scattering will be used to determine the total interference function I(K) and atomic distribution functions of g(r) of these alloys in the liquid and amorphous solid states with differing degrees of disorder. The partial interference functions (or structure factors) and distribution functions will be evaluated from several scattering experiments. Isotope substitution (Ni, Cu, Ti isotopes), isomorphous substitution (Hf for Zr in X-ray experiments, and Co for Ni in neutron experiments), and anomalous dispersion will be used to affect changes in the X-ray and/or neutron scattering cross-sections. Since natural Ti and Mn possess negative scattering cross-sections b for neutrons, it is possible to prepare alloys with (b) equals O, which permits us to determine directly the chemical short-range order in the amorphous and liquid states. X-ray and neutron small-angle scattering will be employed to investigate concentration and density fluctuations in the alloys.

This is a continuation of research previously funded under NSG Grant DMR78-09929-A01. This is the first year of a three-year continuing grant.

SUPPORTED BY U.S. National Science Foundation, Directorate for Mathematical & Physical Sciences, Div. of Materials Research

3.0009, SOLIDIFICATION OF METALLIC MELTS PRODUCED BY LASER IRRADIATION
S.M. Copley, University of Southern California, School of Engineering, Dept. of Materials Science, *3551 University Ave., Los Angeles, California* 90007 (DMR78-07532)

This is a continuation of a basic investigation on the solidification of metallic melts produced by laser irradiation. This program includes studies of: the processes that determine solute distribution; conditions under which the melt will solidify with the same orientation as the substrate; factors which influence the microstructure; and the magnitude of residual stress present in solidified layers. Experiments will be carried out on crystals of Ag-Cu, Ag-Ge and Au-Si. Surface compositions will be modified by plating or physical vapor deposition. The range of incident beam intensities and beam scan rates will be expanded over that previously used in irradiation treatments. The microstructures of irradiated specimens will be characterized by a variety of techniques including transmission electron microscopy, scanning electron microscopy, energy dispersive X-ray analysis, and electron-probe microanalysis. It is expected the results of this research will contribute to a basic understanding of solidification phenomena under far-from-equilibrium conditions, and to a better understanding of processes of possible technological importance, such as laser glazing and surface alloying. This is a continuation of research previously funded under NSF Grant DMR76-08897. This is the first year of a two-year continuing grant.

SUPPORTED BY U.S. National Science Foundation, Directorate for Mathematical & Physical Sciences, Div. of Materials Research

3.0010, INVESTIGATION OF THE STABILITY OF NATURALLY OCCURRING GLASSES
W.P. Glass, University of Delaware, School of Engineering, Dept. of Chemical Engineering, *Newark, Delaware* 19711 (NAS 5-26273)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Goddard Space Flight Center

3.0011, RAPID DETERMINATION OF AVIATION FUEL FREEZING POINTS
C.T. Moynihan, Catholic University of America, School of Engineering & Architecture, Dept. of Chemical Engineering & Mathematical Science, *620 Michigan Ave. N.E., Washington, District of Columbia* 20017 (NAG 3-94)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Lewis Research Center

3.0012, ELECTRONICS MATERIAL SURFACE STUDIES
R. Kaplan, U.S. Dept. of Defense, Navy, Naval Research Lab., *4555 Overlook Ave. S.W., Washington, District of Columbia* 20375 (DN980022)

To obtain a basic knowledge of the physics and chemistry of electronic materials, particularly of those aspects involved in providing the development and characterization of materials needed for high performance and/or less expensive electronic and optical devices and components. To study surface and interface effects in current materials and electronic structures. To investigate new materials and techniques with regard to their surface and interface characteristics and utility.

Leed, Auger, energy loss and photoresponse spectroscopies are used in ultra-high vacuums to study surface and interface crystal structure, electronic structure, and interaction with gases. Etching and deposition are performed and studied in situ. Transport and optical techniques are used to study free carrier energy bands and defect states in semiconductor substrates. Theoretical models are used to examine the electron properties of semiconductor defects and surface states.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Research Lab.

3.0013, PLASMA ETCHING
R. Kaplan, U.S. Dept. of Defense, Navy, Naval Research Lab., *4555 Overlook Ave. S.W., Washington, District of Columbia* 20375 (DN980203)

To obtain a basic knowledge of the chemistry and physics of plasma etching of Si and compound semiconductors, with particular emphasis on those aspects relating to fabrication of small, accurately dimensioned structures required for large-scale integrated circuits. To investigate the possibility of achieving orientation-dependent plasma etching, with application to the tailoring of etched-wall profiles.

Plasma etching will be conducted in a system compatible with ultra-high vacuum instrumentation (Auger spectroscopy, low energy electron diffraction, quadrupole mass analyzer) in order to obtain structural and chemical information regarding substrate surfaces during processing. Simple devices will be fabricated in order to evaluate etched surface electronic properties. Chemical species involved in etching will be studied by detecting their emitted optical radiation.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Research Lab.

3.0014, CHEMICAL KINETICS
M.C. Lin, U.S. Dept. of Defense, Navy, Naval Research Lab., *4555 Overlook Ave. S.W., Washington, District of Columbia* 20375 (DN480193)

To develop a better understanding of the kinetics and mechanisms of elementary chemical processes which are of basic importance to chemical lasers, fire suppression, combustion, rocket propulsion and related subjects of interest to the Navy.

The kinetics and mechanisms of exothermic reactions, involving a variety of reactive species such as atoms and free radicals of importance to lasers, combustion and flame systems, are systematically studied. Flash photolysis, electrical and microwave discharges, laser excitation and other conventional kinetic methods are used. Emphasis is also placed on the use of computers to model chemical systems.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Research Lab.

3.0015, EFFECTS OF STRESS ON POLARIZED FERROELECTRIC CERAMICS
R.W. Timme, U.S. Dept. of Defense, Navy, Naval Research Lab., Underwater Sound Reference Div., *P.O. Box 8337, Orlando, Florida* 32856 (DN680267)

Characterize the effects of single and multi-dimensional sustained stresses on polarized ferroelectric ceramics. The potential relevance of this work is that a better understanding of how stresses individually and collectively act to affect the polarization, and therefore the piezoelectric and dielectric characteristics, of the ceramic may lead to the more nearly optimum design and use of acoustic transducers.

Characterization of the polarized ferroelectric ceramics will be accomplished by measuring the elements of the piezoelectric constant tensors d and g and the dielectric constant tensor epsilon as a function of stress magnitude, dimensionality, and orientation.

SUPPORTED BY U.S. Dept. of Defense, Navy, Office of Naval Research

3.0016, ALKALI-RARE GAS AND METAL-HALIDE MOLECULES AS POTENTIAL TUNABLE AND EFFICIENT LASERS IN THE VISIBLE SPECTRUM
J.G. Eden, University of Illinois, Urbana Champaign Campus, Graduate School, *Urbana, Illinois* 61801 (DF056960; AFOSR-79-0138)

AF function - this research will stimulate and support new ideas in the general area of high energy lasers. These lasers are

of enormous long-range importance to the Air Force in diverse areas such as aircraft structure performance to weaponry and weapons guidance. Opportunity - a new idea is to be pursued which can make previous problems with a promising class of potential lasers, alkali-rare gas excimers, amenable to solution. Contribution - this research effort will explore a novel means of making alkali-rare gas excimer lasers with potential for high power and efficiency in the visible spectrum. Objective - the objective of this research is to explore novel means to excite alkali-rare gas excimer lasers.

Optical pumping of alkali halides will be used as a non-corrosive means of obtaining excited alkali atoms which can form alkali-rare gas atoms. Initial experiments will demonstrate the process using excimer laser pump sources. Later experiments will be aimed at pumping with xenon excimer fluorescence excited by a coaxial electron beam in a geometry which is inherently capable of high efficiency.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

3.0017, SUPERCOOLED LIQUIDS AND DISORDERED CRYSTALS BY EXPERIMENTS AND SIMULATION

C.A. Angell, Purdue University, School of Science, Dept. of Chemistry, *Executive Bldg., West Lafayette, Indiana* 47907 (DMR80-07053)

This project is directed toward an understanding of the glass transition which is perhaps the least well understood of the many transitions in condensed matter. At the glass transition, which effectively marks the end of the liquid state for supercooling liquids, quite abrupt changes in thermodynamic properties occur with essentially no structural changes. The mystery is not so much in the observed phenomenon, which manifests simply a loss of the equilibrium state, but in the behavior implied for very slow experiments in which an equilibrium second order transition would evidently occur some 20 to 40 degrees below the observed transition temperature. There is currently no statistical thermodynamic theory for such a transition in disordered materials.

In the present work, a family of polyhydroxy molecular liquids is being studied in detail because of preliminary evidence for a simple relation between the relaxation time and the theoretical transition temperature. This same family will be studied also as it is made ionic by replacement of protons with sodium ion, thereby uncoupling conducting modes of motion from the remainder. Some previously unstudied ionic chloride glasses will be studied for materials applications, particularly as laser hosts. Two further projects dealing with crystallization of glasses near the glass transition, and with computer simulation of geochemically interesting systems, will be included.

First year of a three-year continuing grant; renewal of work supported by DMR77-04318.

SUPPORTED BY U.S. National Science Foundation, Directorate for Mathematical & Physical Sciences, Div. of Materials Research

3.0018, KINETICS OF RARE GAS HALIDE AND MERCURY HALIDE LASERS

D.W. Setser, Kansas State University, School of Arts & Sciences, Dept. of Chemistry, *Anderson Hall, Manhattan, Kansas* 66502 (DN675182; N00014-76-C-0380)

The objective of this study is to obtain a better understanding of the kinetics of rare gas halide and mercury halide visible or uv lasers. It will have application to development of laser systems for potential naval optical surveillance and reconnaissance.

Rate constant and branching ratio measurements will be made for metastable Ne reacting with halogen-containing compounds, and for metastable Ar, Kr, and Xe reacting with HgX2(X=Cl, Br, I). Quenching rates of HgX(B) will be measured by time-resolved fluorescence following photodissociation of HgX2 with a pulsed ArF laser. Emission spectra resulting from positive-negative ion recombination will be studied by the flowing afterglow technique, with specific emphasis on the recombination of rare gas positive ions and negative halide ions as a possible means to produce electronically excited molecular states. An attempt will be made to develop a flowing afterglow source of Hg(3P2) atoms and measure quenching rates and product-branching ratios.

SUPPORTED BY U.S. Dept. of Defense, Navy, Office of Naval Research

3.0019, LASER PROTECTION PROPERTIES OF SOME TRANSITION ELEMENT BORIDES

T.V. Hynes, U.S. Dept. of Defense, Army, Army Materiel Development & Readiness Command, Materials & Mechanics Research Center, *Watertown, Massachusetts* 02172 (DA0F4800)

The protection of metal surfaces from damage by high energy lasers will be enhanced by an understanding of the interaction mechanisms. Coatings of borides will be prepared and deposited on metals in film form to increase beam decoupling. The properties of such protective coatings will be measured as functions of the usual laser test parameters.

Titanium diboride has unusual conduction properties. Theory indicates that the infrared reflectivity is dependent on the metallic conductivity leading in this case to a possibly enhanced protection against laser damage. Other borides will be investigated for such behavior. Nickel and cobalt borides will be investigated and attempts will be made to deposit films on suitable substrates. Differences in damage levels will be related to relevant laser test conditions and sample properties.

SUPPORTED BY U.S. Dept. of Defense, Army Materiel Development & Readiness Command, Materials & Mechanics Research Center

3.0020, CORROSION EVALUATION OF M/M COMPOSITES

M. Levy, U.S. Dept. of Defense, Army, Army Materiel Development & Readiness Command, Materials & Mechanics Research Center, *Watertown, Massachusetts* 02172 (DA0H4705)

The technical objectives are to study the mechanism of corrosion and stress corrosion of light-weight, metal-matrix composites, such as FP/Mg, Gr/Al, SiC (continuous fibers and whiskers)/Al, and FP/Al, and to devise means of corrosion inhibition and protection. Specific applications of these composite materials will be in bridging components and in helicopter drive systems which are subject to corrosive air and water environment.

The corrosion behavior of graphite-Mg, graphite-Al, FP-Mg and FP-Al composites in the absence of stress will be determined and compared with the matrix metal by measuring (1) their response to potentiostatic polarization, (2) the corrosion potential, (3) weight loss, (4) changes in ultimate tensile strength after exposure to aqueous salt solutions and other selected environments. The simultanious effect of stress and environment will be examined by testing in tension under constant load in the presence of the environment. Corroded and stress-corroded surfaces will be examined by optical metallography for correlation with electrochemical and weight loss measurements.

SUPPORTED BY U.S. Dept. of Defense, Army Materiel Development & Readiness Command, Materials & Mechanics Research Center

3.0021, SHAPE MEMORY AND SUPERELASTICITY IN POLYCRYSTALLINE MARTENSITE MEMORY ALLOYS

L.A. Shepard, U.S. Dept. of Defense, Army, Army Materiel Development & Readiness Command, Materials & Mechanics Research Center, *Watertown, Massachusetts* 02172 (DA0G4755)

Among the many alloys which exhibit the shape memory effects, only one, NiTi, can be used in polycrystalline form. The rest must be expensively converted to single crystals to show this effect. The purpose of this study is to understand the factors limiting shape memory and superelasticity in polycrystalline alloys and to try to overcome these limitations.

The experimental attack will take two directions: first, to try to understand the unexplained aspects of the shape memory process in polycrystalline NiTi, and second, to examine other (principally copper-based) alloys with similar structures, martensitic tranformations and twinning. Effects of deformation, re-

crystallization and alloying upon the toughness and fatigue resistance of the polycrystalline alloys will be pursued.

SUPPORTED BY U.S. Dept. of Defense, Army Materiel Development & Readiness Command, Materials & Mechanics Research Center

3.0022, THERMODYNAMICS OF IONIC AND MOLECULAR CRYSTALLINE PHASES
E.F. Westrum, University of Michigan, Ann Arbor Campus, School of Literature Science & the Arts, Dept. of Chemistry, *Ann Arbor, Michigan* 48104 (CHE80-07977)

This grant is in the Structural Chemistry and Thermodynamics Program in the area of experimental thermodynamics. The primary focus of the work will be on studying solid systems at low temperatures using calorimetric techniques; however, some studies on systems at intermediate and high temperatures are also anticipated. Special emphasis will be placed on systems undergoing phase changes such as melting, with a view toward correlating bulk thermodynamic properties with behavior on a molecular scale. This work is a continuation of Foundation grant CHE 7710049.

SUPPORTED BY U.S. National Science Foundation, Directorate for Mathematical & Physical Sciences, Div. of Chemistry

3.0023, EFFECT OF REFINING VARIABLES ON THE PROPERTIES AND COMPOSITION OF JP-5
M. Lieberman, Exxon Research & Engineering Co., Government Research Laboratories, *1600 Linden Ave., Linden, New Jersey* 07036 (DN889819; N00140-78-C-1491)

Identify and assess potential future problem areas relative to the properties and composition of both domestic and foreign JP-5 fuels produced from petroleum over the next five to ten years. Emphasis will be placed on current specification fuels but the effects of relaxation of or changes in current specifications will also be studied.

Establish current and future industry representative distribution of crudes, refinery types and locations, and processing schemes used to produce JP-5. Determine any crude/refinery constraints that do or will exist that can limit the quantity or affect the chemical composition of JP-5 fuel. Determine the effect that demand for other fuels could have on the supply of JP-5 fuel. Determine how chemical composition and properties of fuel are influenced by fuel specifications, crude oil types, processing blending, handling and storage. Determine the effects of changes in the chemical composition and properties of fuel on engine or airframe components. Analyze projected changes in JP-5 properties and composition to identify potential future problem areas. Subject most important potential problem areas to detailed analysis.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Air Propulsion Test Center

3.0024, EFFECT OF STRESS ON ULTRASONIC PULSES IN FIBER-REINFORCED COMPOSITES
J.H. Hemann, Cleveland State University, School of Engineering, Dept. of Civil Engineering, *1983 E. 24th, Cleveland, Ohio* 44115 (NAG 3-106)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Lewis Research Center

3.0025, ALTERNATE FUELS COMBUSTION INVESTIGATIONS
T.A. Jackson, U.S. Dept. of Defense, Air Force, Aero Propulsion Lab., *Wright Patterson A.F.B., Dayton, Ohio* 45433 (DF458210)

Expanded-specification petroleum fuels and fuels from oil shale and coal are being considered for future use in Air Force aircraft. The objective of this effort is to examine and quantify the effects of appropriate fuel character changes on the engine combustion systems. These findings will be used as a basis for decisions regarding (a) the extent to which current systems can tolerate changes in fuel quality, (b) future modifications to combustion systems to allow use of reduced quality fuels, and (c) the tradeoff of fuel processing cost versus the cost of modified combustor designs.

A sophisticated Raman system to measure exhaust pollutants from an aircraft engine was developed on an AFAPL contract. It is now apparent that this system has many capabilities which can be utilized for combustion diagnostic purposes. For example, it can determine time-averaged temperature and specie concentration measurements, it has been hardened to operate in the adverse environment of a jet engine, Raman Stokes and anti-Stokes, MIE and Rayleigh scattering and fluorescence can be detected, and point measurements rather than integrated absorption methods can be accomplished. The approach is to apply this Raman system to a variety of different practical combustion problems. System capabilities and limitations will be determined in the following applications: exhaust plane temperature and species mapping, after-burner efficiency measurement, main burner pattern factor measurement, and main burner temperature and species mapping.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Aero Propulsion Lab.

3.0026, NAVY VEHICLE DESIGN AND CONSTRUCTION - ORIENTED POLYMERS
J.L. White, University of Tennessee, Knoxville Campus, School of Engineering, Dept. of Chemical & Metallurgical Engineering, *W. Cumberland Ave. S.W., Knoxville, Tennessee* 37916 (DN775285; N00014-77-C-0236)

New polymeric compositions of high strength are of interest to the Navy for improved lightweight composites because lightweight organic structural materials can provide much improved payload/weight ratios in aircraft and surface effect ships. The proposed research will provide new materials and theoretical models to meet Navy needs in this area.

This work will be directed toward the preparation of biaxially oriented aromatic polyamide films from liquid crystalline polymer solutions. Experiments will be carried out to determine whether the successful one-dimensional approach utilized for fiber spinning can be extended to other shapes and structures.

SUPPORTED BY U.S. Dept. of Defense, Navy, Office of Naval Research

3.0027, CHEMICAL ANALYSIS OF MARTIAN ANALOG SAMPLES
V.Y. Young, Texas A & M University, College Station Campus, School of Science, Dept. of Chemistry, *College Station, Texas* 77843 (NAS 9-16185)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Lyndon B. Johnson Space Center

3.0028, MATERIALS SUPPORT TECHNOLOGY - REACTIONS OF ALCOHOLS ON ACTIVATED SURFACES
J.M. White, University of Texas, Austin Campus, School of Natural Sciences, Dept. of Chemistry, *200 W. 21st St., Austin, Texas* 78712 (DN475445; N00014-75-C-0922)

Semiconductor and insulator materials are used extensively throughout the Navy in monitoring, surveillance and electronic devices. These surface studies are important in determining mechanisms for the degradation of semiconductor and insulator materials, in devising techniques for radiation hardening, and for enhancing the efficiencies of semiconductor electrodes in batteries and fuel cells.

Photoelectron spectroscopy, Auger electron spectroscopy, mass spectrometry, and thermal desorption will be used in a single vacuum chamber to study the reactions of a series of alcohols and organic amines on several surfaces, including alumina (insulator), zinc oxide (semiconductor), and magnesium oxide (intermediate). The electronic structure of the adsorbates and surfaces will be studied, as well as the kinetics of the reactions taking place.

SUPPORTED BY U.S. Dept. of Defense, Navy, Office of Naval Research

3.0029, INVESTIGATION OF REINFORCED THERMOPLASTIC COMPOSITES
J.T. Hoggatt, Boeing Co., Boeingaerospace, *7555 E. Marginal Way S., Seattle, Washington* 98124 (DN890171; N00019-79-C-0203)

To evaluate fiber-reinforced thermoplastics for aircraft and missile structures.

To develop methods for impregnation and fabrication of high temperature thermoplastic materials. Evaluate significant mechanical and physical properties of laminates. Initiate synthesis and reformulation efforts to develop improved polymer systems.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Air Systems Command

3.0030, ATOMIC AND ELECTRONIC STRUCTURE OF GLASS BY X-RAY TECHNIQUES
F.W. Lytle, Boeing Engineering & Construction Co., *Seattle, Washington* 98124 (DMR80-13706)

This research will make optimum use of the X-ray facilities at the Stanford Synchrotron Radiation Laboratory in a multi-dimensional investigation of the structure of glass. The following three areas will be emphasized: (1) The random network versus microcrystallite theories will be critically examined via a three-fold experimental approach using Extended X-ray Absorption Fine Structure (EXAFS), anomalous dispersion with wide angle X-ray scattering and anomalous dispersion with small angle X-ray scattering experiments. (2) The atomic and electronic structure of elements added to glass will be studied using the X-ray techniques mentioned in (1) above. (3) Development of an optical EXAFS technique will continue.

All of these research areas can be approached at an unprecedented level of experimental sophistication only because of the availability of the synchrotron X-ray source. This is a renewal of NSF Grant DMR77-12919.

This is the first year of a three-year continuing grant.

SUPPORTED BY U.S. National Science Foundation, Directorate for Mathematical & Physical Sciences, Div. of Materials Research

3.0031, ENERGY CONVERSION - SEMICONDUCTOR ELECTRODES IN OPTICAL ENERGY CONVERSION
A.B. Ellis, University of Wisconsin, Madison Campus, School of Chemistry, Dept. of Chemistry, *Agriculture Hall, Madison, Wisconsin* (DN875507; N00014-78-C-0633)

Electrochemical processes are involved at semiconductor-electrolyte interfaces which find applications in optical energy conversion systems, in photoelectrolysis, and semiconductor passivation (anodization). The energy transfer mechanisms are not well understood, in general, and long-term stability, optimization of materials, and improved optical energy conversion efficiency are important goals to pursue. This information will be used in developing Navy energy conversion systems.

The investigator will use photoluminescence techniques to study the emission properties of the semiconductor in a photoelectrochemical cell. Various compound semiconductor materials and electrolyte solutions will be used. Those systems will be optimized which result in minimum photodecomposition of the semiconductor electrode. Mechanisms for the transfer of charge from the semiconductor to ions in the electrolyte will be investigated in attempts to associate surface states with the transfer process. Non-radiative and radiative decay modes following photon absorption will be studied to determine the distribution of energy into recombination, heat dissipative processes, photoelectrochemistry of the electrolyte (i.e., oxidation and reduction), and photodecomposition of the semiconductor electrode. From the models evolved, efficiency-optimized systems will be determined. Time-dependent measurements will be made to quantify the various rate constants.

SUPPORTED BY U.S. Dept. of Defense, Navy, Office of Naval Research

3.0032, RECOMBINATION IN SOLAR CELL MATERIALS
P. Landsberg, University of Southampton, *Southampton, England, United Kingdom* (DF462090; AFOSR-77-3437)

Investigate, in detail, the theory and effects of multiphon emission-recombination and phonon-assisted Auger recombination of minority carriers in solar cell semiconductor materials.

Review theoretical and experimental information on recombination in semiconductors. Develop multiphon and phonon-assisted Auger recombination models correlated with known behavior. Correlate MP and PA Auger with phonon degradation.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Aero Propulsion Lab.

ENGINEERING

Includes Engineering (general); Communications; Electronics and Electrical Engineering; Fluid Mechanics and Heat Transfer; Instrumentation and Photography; Lasers and Masers; Mechanical Engineering; Quality Assurance and Reliability; and Structural Mechanics. For Related Information See Also Physics.

4.0001, GEOSTATIONARY PLATFORM WORKSHOP
E.A. Carter, University of Alabama in Huntsville, School of Science & Engineering, Dept. of Environmental Science, *Huntsville, Alabama* 35807 (NAS 8-34187)

SUPPORTED BY U.S. National Aeronautics & Space Admin., George C. Marshall Space Flight Center

4.0002, FILTRATION ELEMENT FOR FLUIDIC AND PNEUMATIC CONTROL AIR SUPPLIES
D.J. Schaffer, Signal Co. Inc., Airesearch Manufacturing Co, *402 S. 36th St., Phoenix, Arizona* 85034 (DN890123; N00019-78-C-0393)

Conduct a research and development project to investigate and develop design criteria for a pneumatic filtration device.

An investigation of filter requirements will be conducted and design criteria established based upon air pressures, flow rates, temperatures and contaminant levels of aircraft engine bleed air and compressor outputs. Based on these criteria, filtration components will be fabricated and tested for a specific aircraft application.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Air Systems Command

4.0003, INVESTIGATION AND TECHNICAL PLAN FOR IONOSPHERIC MODELS
A. Marouf, California State University & Colleges, California State University, Fullerton Campus, School of Mathematics Science & Engineering, Dept. of Electrical Engineering, *800 N. State College Blvd., Fullerton, California* 92631 (NAS 9-16207)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Lyndon B. Johnson Space Center

4.0004, NEW APPROACHES TO OPTICAL SYSTEMS FOR INERTIAL ROTATION SENSING
M. Chodorow, Stanford University, School of Engineering, Dept. of Electrical Engineering, *Stanford, California* 94305 (DF057980; F49620-80-C-0040)

AF function- navigation, guidance and control of aircraft, spacecraft and missiles require sensors of angular rotation rate in inertial space. However, conventional gyroscopic sensors pose cost and adaptation problems. Opportunity - although the coming use of ring lasers in strapdown systems will offer considerable advantages, proper use of new integrated optics and integrated circuit advances will minimize the cost and maximize the adaptability and availability of these new sensors which allow the direct measurement of absolute inertial rotation rate without requiring comparison with other standards for calibration. Objective - the intrinsic limitations of ring lasers are to be avoided by new approaches which have the potential for integrated optics implementation and high performance cost ratio. How work contributes - this research should lead to devices which are free from lock-in and bias effects encountered in conventional laser gyros, have high sensitivity and accuracy and

allow ready adaptation to specific requirements such as size reduction, cost decrease or sensitivity increase and adaptation to a specific environment and geometry.

The new approaches are based on the SAGNAC effect like the ring laser. However, in contrast to the latter, the laser source is outside the ring, pulse transmission and amplification in a multi-turn loop is used, which leads to a frequency read-out signal equivalent to that of a conventional ring laser. Optical fiber waveguides appear promising for constructing the sensing loops, offering unique advantages in fabrication and application. Calculations have indicated sensitivities in measurement down to very low rotation rates suitable for future navigation systems. This phase of the investigation continues experiments with components of what is referred to as the active re-entrant SAGNAC system (ARS) using a CW He-Ne laser and a passive multiple fiber loop, then recirculation and sampling and later active recirculating of pulses from a solid-state laser.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

4.0005, RESEARCH RELATIVE TO LOW NOISE AMPLIFIERS FOR RADIO ASTRONOMY

W.J. Welch, University of California, Berkeley Campus, School of Engineering, Dept. of Electrical Engineering & Computer Science, *Berkeley, California* 94720 (NAG 5-95)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Goddard Space Flight Center

4.0006, RECOVERY OF ENERGY FROM ION BEAMS

A.T. Forrester, University of California, Los Angeles Campus, School of Engineering & Applied Science, Dept. of Electrical Sciences & Engineering, *405 Hilgard Ave., Los Angeles, California* 90024 (CPE78-19642 A01)

The research deals with the recovery of energy from ion beams which is a fundamental problem where beams are used. Using a high space charge ion beam propagating through a crossed magnetic field and a deceleration system, an experimental investigation of the physics of decelerating an intense ion beam is undertaken. The research characterizes the parameters of such a deceleration scheme and compares them to the theory.

The cross-flow of electrons in the deceleration gap is investigated to determine the source of the electrons, quantity, and necessity of supplying some fraction on all of them by an additional cathode. The leakage of electrons across the deceleration sheath to the collector, causing a deterioration in efficiency, is monitored. Experimental schemes such as small configuration changes to inhibit leakage have been proposed and will be implemented as needed. Various values of beam energy and current density are to be tried in an effort to determine the effect of space change levels on the parameters of the decelerator and its efficiency.

The research is a continuation of that done under NSF Grant ENG7819642.

SUPPORTED BY U.S. National Science Foundation, Directorate for Engineering & Applied Science, Div. of Chemical & Process Engineering

4.0007, RESEARCH ON HETEROGENEOUS TURBULENT FLOWS

P.A. Libby, University of California, San Diego Campus, Graduate School, Dept. of Applied Mechanics & Engineering Science, *P.O. Box 109, La Jolla, California* 92037 (DN975362; N00014-79-C-0355)

The objective of this study is to develop a better understanding of variable density effects on turbulence and mixing in non-reactive flows, and the interaction of those effects with chemistry in reactive flows. This information is needed both for improved prediction of the complex mixing and combustion processes within the combustors of aircraft turbojet engines, and to provide a basis for advanced combustor design. Ultimately it should lead to improved propulsion systems for naval weaponry applications.

A mixing region will be formed by injecting a two-dimensional helium jet, which may be heated, into a moving airstream. Hot wire anemometry and thermometry will be combined with statistical techniques to study the mixing process. The present jet generator will be modified to obtain improved two-dimensional results close to the point of injection. Further measurements will be made both in this region and downstream under the influence of a stream-wise pressure gradient. A coordinated theoretical study of turbulent reacting flows with premixed reactants will be carried out utilizing an improved representation of the turbulent transport. Emphasis will be on the interaction between the turbulent fluctuations and the reactive heat release, with specific application to oblique flames and the effects of acceleration on turbulent flames.

SUPPORTED BY U.S. Dept. of Defense, Navy, Office of Naval Research

4.0008, GROWTH AND CHARACTERIZATION OF EPITAXIAL PIEZOELECTRIC SEMICONDUCTOR FILMS

K.M. Lakin, University of Southern California, School of Engineering, Dept. of Electrical Engineering, *3551 University Ave., Los Angeles, California* 90007 (DF047570; F49620-79-C-0138)

AF function - microwave signal processing devices are essential components of Air Force communications, reconnaissance, and electronic countermeasures systems. Opportunity - microwave signal processing devices can utilize surface acoustic waves (SAWs) to perform functions such as filtering, encoding and decoding, signal delay, and signal correlation or convolution. Optimum performance of these functions is limited by the material used to support the SAWs, and improvements can be expected when materials having more appropriate SAW properties are utilized. Objective - this research will investigate new structures for supporting surface acoustic waves. How work contributes - the effort will advance surface acoustic wave devices for microwave signal processing.

Optimum conditions will be determined for the deposition of high quality single crystal aluminum nitride films on sapphire substrates. An alternative to this structure is zinc oxide films on non-piezoelectric substrates; therefore, the reaction kinetics and flow dynamics involved in ZnO film preparation by the reaction of water and diethyl zinc will be studied. Hydrothermal growth will be investigated to determine what improvements might be realized in the growing of piezoelectric thin films over the techniques of chemical vapor deposition, liquid phase epitaxy, and molecular beam epitaxy.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

4.0009, RESONANT ABSORPTION AND PARAMETRIC DECAY INSTABILITIES IN LASER-GENERATED PLASMAS

P.W. Chan, Colorado State University, School of Engineering, Dept. of Electrical Engineering, *Fort Collins, Colorado* 80523 (ENG78-05894)

This program is an experimental investigation of anomalous heating of plasmas produced by irradiation of polysterene targets with carbon dioxide laser radiation. Plasma heating due to resonant absorption at oblique incidence and to the parametric decay instability is being investigated in detail. For the study of resonant absorption, the CO2 laser is split into two beams; one is used for plasma production and the other is used for plasma heating at different angles of incidence. The diagnostics include measurements of absorbed CO2 laser energy using an integrating sphere, measurement of electron and ion energy using a retarding potential energy analyzer, and determination of the spectra of resonant oscillation by incoherent scattering using a probing ruby laser beam. For the study of plasma heating via parametric decay instability, a single CO2 laser beam is used for plasma generation and heating. A probing ruby laser beam is used for scattering to observe the spectra of the electron-plasma and ion-acoustic lines. The frequency shifts of these lines can be used for positive identification of parametric decay instability. The line-widths give the damping rate and the line intensities (corresponding to growth rates), which are studied as a function of the incident laser power density. The absorbed laser energy, electron and ion energy are monitored as in the case of resonant absorption. In addition, temporal and spatial resolved holographic interferometry, Schlieren and shadowgram are em-

ployed to measure density, density scale length and electron temperature.

This is a continuation of research previously supported under NSF grant ENG-7418623.

SUPPORTED BY U.S. National Science Foundation, Directorate for Engineering & Applied Science

4.0010, AN INVESTIGATION OF THE FLOW DYNAMICS OF UNSTEADY SEPARATED REGIONS

M.S. Francis, U.S. Dept. of Defense, Air Force, Frank J. Seiler Research Lab., *Air Force Academy, Colorado Springs, Colorado* 80840 (DF281760)

AF function - technology base. Deficiency - insufficient knowledge of the flow behavior of unsteady separated flow germane to a wing of a maneuvering aircraft. Research - develop a flow model through extensive theoretical and experimental analysis of an unsteady separated region on an airfoil. How research contributes - results will describe the behavior of unsteady separated flow germane to helicopter rotors, aircraft maneuvering at high angles of attack, and jet engine compressors. Abstract - a combined analytical and experimental investigation will be employed to determine the nature and details of the flow field physics in an unsteady separated region above a lifting airfoil. Models employing the concepts of vorticity and mass transfer will be developed to understand and explain the viscous-inviscid interactions and resultant wing-loading characteristics. Wind and water tunnel experiments employing a wing with an oscillating spoiler will be used to verify the theoretical results and provide an understanding of the basic physical mechanisms. The extension of these models to various other flow situations may also be considered dependent upon the nature and characteristics of the preliminary results.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Frank J. Seiler Research Lab.

4.0011, PROPERTIES OF LIQUIDS AND THEIR PHASE TRANSITIONS

R.E. Apfel, Yale University, School of Engineering, Dept. of Engineering & Applied Science, *206 Elm, New Haven, Connecticut* 06520 (DN223158; N00014-76-C-0527)

It is the objective of this research to study metastable liquids and their phase transitions; this includes a detailed investigation of cavitation. Results of this research should aid the Navy's efforts in reduction of noise from propellers and around sonar domes due to cavitation, and increase our understanding of heat-transfer liquids.

The ability to isolate droplets of metastable liquids in an inert host by acoustic levitation provides a means to study phase transition phenomena such as the boiling, freezing and cavitation of superheated, supercooled, and overexpanded liquids, respectively. Measurements of basic properties such as density, adiabatic compressibility, tensile strength, and sound speed are made on liquids in their metastable state. Work on liquid interfacial properties is based on surface wave-generation on levitated drops.

SUPPORTED BY U.S. Dept. of Defense, Navy, Office of Naval Research

4.0012, OPTICAL ATTITUDE CONTROL OF FLEXIBLE SATELLITES

K.T. Alfriend, U.S. Dept. of Defense, Navy, Naval Research Lab., *4555 Overlook Ave. S.W., Washington, District of Columbia* 20375 (DN680434)

The objective of this program is the development of methods for the optical and sub-optical attitude control of flexible satellites.

The initial step is the implementation of the satellite flexibility into the control problem. This will be accomplished by investigating the various methods for modeling the flexibility to see how they can be included in the control problem. Various classical satellite problems will then be considered to compare methods of minimizing flexible body motion. Finally, general methods will be developed.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Research Lab.

4.0013, M/W INTERACTIONS WITH SEMICONDUCTOR DEVICES

A.P. DeFonzo, U.S. Dept. of Defense, Navy, Naval Research Lab., *4555 Overlook Ave. S.W., Washington, District of Columbia* 20375 (DN880030)

To investigate the interaction of light with solid-state microwave devices so that optical control may be implemented to study the dynamics of carrier transport, carrier relaxation, trapping, mobility in amorphous and III-V semiconductors. Through light control of solid-state devices, it is expected that new solid-state device capabilities will result and improved performance from existing devices realized. The Navy has a need for semiconductor devices with improved performance and a hybrid optical/microwave technology may satisfy these requirements.

Using semiconductor lasers and fiber optics, light will be directed onto semiconductor devices to investigate gating, frequency shifting, domain initiation and phase locking. Basic physical interactions will be investigated using picosecond laser sources, and optically synchronized electrical switches. Carrier mobility, relaxation, trapping and high field band bending effects will be investigated. Subpicosecond transient effects will be investigated using mode-locked dye lasers.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Research Lab.

4.0014, MOTION DRIVE SIGNALS FOR FLIGHT SIMULATORS

W.T. Harris, U.S. Dept. of Defense, Navy, Naval Training Equipment Center, Advanced Simulations Concepts Lab., *Orlando, Florida* 32813 (DN794017)

Develop several methods for calculating motion drive signals in flight simulators and relate them to motion system characteristics, flight maneuvers and training effectiveness.

Select several methods from those found in use or in the literature. Perform a preliminary selection of algorithms to be evaluated for training effectiveness by two selection experiments; the first based on system performance measures (an in-simulator study), the second, a comparison of pilot control activity (in simulator to aircraft). Then evaluate the pre-selected algorithms using transfer of training methods.

SUPPORTED BY U.S. Dept. of Defense, Naval Training Equipment Center, Advanced Simulations Concepts Lab.

4.0015, CRUISE MISSILE/CAVITY OSCILLATION ENVIRONMENTS

H.W. Bartel, Lockheed Aircraft Corp., *Marietta, Georgia* (DF143250; F33615-79-C-3207)

Internally carried weapons can be exposed to very intense fluctuating pressures when the weapons bay doors are opened during flight for weapon ejection. These fluctuating pressures have been severe enough to cause damage to the weapons as well as the aircraft structure itself. Some of the configurations proposed to internally carry cruise missiles could result in very high fluctuating pressure levels. The objective of this effort is to investigate the aeroacoustic environment of each of the proposed configurations and develop prediction methods that will enable determination of the internal levels that cruise missiles will be subjected to. The results of this effort will enable the design of cruise missiles to realistic environments, thus increasing reliability and decreasing weight and costs.

Determination of all of the proposed cruise missile carrier configurations will be made. An acoustic analysis will be performed for each configuration to determine the intensity and spectrum of the internal aeroacoustic environments. Analytical prediction methods will be formulated for defining the environ-

ments as a function of Mach number, altitude, and configuration.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Flight Dynamics Lab.

4.0016, INTERDISCIPLINARY COLLABORATION IN TRIBIOLOGY
H.S. Cheng, Northwestern University, Evanston Campus, Technological Inst., Dept. of Mechanical & Nuclear Engineering, *633 Clark St., Evanston, Illinois* 60201 (NCC 3-13)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Lewis Research Center

4.0017, TIME AND FREQUENCY DISSEMINATION
R.E. Beehler, U.S. Dept. of Commerce, National Bureau of Standards, Center for Absolute Physical Quantities, *Rte. 270, Gaithersburg, Maryland* 20234 (52406)

OBJECTIVE: To disseminate highly reliable standard T/F information via LF and HF radio broadcasts; satellites of opportunity; and the calibration of appropriate non-NBS broadcasts usable as transfer standards to users requiring accuracies as good as 0.1 microseconds and 1 times 10 to the 13th power for time and frequency, respectively, during the 1980-1985 period.

SUPPORTED BY U.S. Dept. of Commerce, National Bureau of Standards, Center for Absolute Physical Quantities

4.0018, SPACEGRAPH IOS DISPLAY STUDY
L.D. Sher, Bolt Beranek & Newman Inc., *50 Moulton St., Cambridge, Massachusetts* 02138 (DF228820; F33615-79-C-0013)

The objective of this effort is to study the various ways in which the unique 3-d capabilities of the spacegraph display can be matched to the specialized display problems of the IOS of a modern flight simulator.

The study will examine the overlap between the information-display attributes of an IOS and the corresponding attributes of spacegraph which promise utility in IOS applications. The work will include identifying and categorizing the types of information to be displayed and current characteristics of spacegraph which are applicable, developing new ways of using spacegraph and examining those characteristics which promise utility, developing additional parts of the spacegraph system, generating priorities for future developments and demonstrating the system.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Human Resources Lab.

4.0019, RAMAN LIDAR FIELD TESTS
D. Leonard, Computer Genetics Corp., *4 Lake Side Office Park, Wakefield, Massachusetts* 01880 (DN781308; N62269-76-C-0302)

To demonstrate accurate correlation of Raman lidar and radiosonde measurements. This contract supports work unit XK200, Agency Accession No. DN 081135.

Field tests will be performed at Wakefield, Massachusetts, utilizing Raman lidar eqiupments to demonstrate water vapor concentration, temperature and transmission profile measurement capability. Additional measurement capabilities such as wind velocity and aerosol concentration will be investigated.

SUPPORTED BY U.S. Dept. of Defense, Naval Air Development Center, Sensors & Avionics Tech Directorate

4.0020, EXPERIMENTAL STUDIES OF FLIGHT PERFORMANCE OF GLIDING PARACHUTES
W. Nykvist, U.S. Dept. of Defense, Army, Natick Research & Development Command, *Natick, Massachusetts* 01760 (DA0H4257)

To obtain in-flight aerodynamic performance data to confirm/refine key parameters used in six-degree-of-freedom (6-DOF) computer simulation. To procure and test selected guidance and control systems used to guide a cargo-carrying gliding parachute to a specific landing area.

Design and fabricate a gliding parachute flight data recording system using existing ASN-95 transmitter and receiver. Continuously record up to 14 variables while guiding the parachute through specific maneuvers. Use data to adjust and refine assumptions used in 6-DOF computer program. Use testing experience and computer simulation to choose a specific guidance and control system for procurement and test prior to engineering development.

SUPPORTED BY U.S. Dept. of Defense, Army, Natick Research & Development Command

4.0021, THEORY AND COMPUTATION OF SINGULAR OPTIMAL CONTROLS
W.F. Powers, University of Michigan, Ann Arbor Campus, School of Engineering, Dept. of Aerospace Engineering, *Ann Arbor, Michigan* 48104 (ENG77-16660)

This research deals with problems, such as the choice of the trajectory for the space shuttle, in which use of fuel or similar resources must be minimized. The principal investigator deals with the theory and the computational practice of the treatment of such problems and of the special difficulties (the so-called 'singularities') that must be overcome in their solution. It is an unusually successful and useful line of research.

SUPPORTED BY U.S. National Science Foundation, Directorate for Engineering & Applied Science

4.0022, BIODYNAMIC RESPONSE
A.I. King, Wayne State University, School of Engineering, Dept. of Mechanical Engineering, *5950 Cass Ave., Detroit, Michigan* 48202 (DN123393; N00014-75-C-1015)

For the purpose of minimizing pilot injury, experimental and analytical techniques are being used to study the biodynamic response of naval pilots when subjected to parachute opening or ejection shock.

Because of the relevance of cervical vertbral motion to neck injury, improved instrumentation techniques are being planned to better determine vertebrae kinematics during test runs on cadavers or anthropomorphic dummies. In addition, some experiments are being contemplated wherein body motion will be examined subsequent to target impact and correlations attempted with mathematical models of the same.

SUPPORTED BY U.S. Dept. of Defense, Navy, Office of Naval Research

4.0023, INFLUENCE OF WALL ROUGHNESS ON THE CORE FLOW IN A SUPERSONIC MHD GENERATOR
P. Lu, University of Nebraska, Lincoln Campus, School of Engineering & Technology, Dept. of Mechanical Engineering, *Lincoln, Nebraska* 68508 (DF054810; AFOSR-79-0083)

AF function - weapon delivery and defense, advanced MHD electric power generators and electric lasers. Deficiency - insufficient in-depth understanding of the properties and behavior of flowing phasing and the influence of wall roughness on the core flow and associated pressure increase in supersonic MHD electric power generators. Objective - to better understand the propagation of disturbances along Mach and/or shock waves due to wall roughness and their interactions with the turbulent boundary layer and their influence on the core flow through a supersonic (high-power-density) MHD generator and the possible associated pressure increase, and to develop theoretical and mathematical models describing the interaction and pressure increase phenomena. How work contributes - will provide additional understanding and analytical modeling of the Mach/shock wave-turbulent boundary layer interaction and pressure increase phenomena, in actual MHD generators, will aid in control or reduction of these effects, and will contribute to the technology base required for development of more efficient MHD electric power generators.

An analytical study will be made of the influence of wall roughness on the core flow through a supersonic (high-power-density) MHD electric power generator and the possible associated pressure rise with flow direction. Crocco's theory will be generalized to treat MHD pseudo-shocks as well as wave interaction due to an isolated electrode, in supersonic and high mag-

netic-field strength generator channels. Crocco's control-volume analysis will be enlarged to incorporate all the MHD aspects including load and Hall effects. The analytical model will be used to explain qualitatively modification of the core flow due to shock and Mach wave interactions with the turbulent boundary layer near the wall as well as the observed pressure rise in the flow direction downstream observed in actual MHD generators. Theoretical results will be compared with those obtained in practical cases at AFAPL. Recommendations will be made of the desirability of continuing future investigations in MHD power generators along the same line of approach.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

4.0024, COMMUNICATION - ROTATIONAL RELAXATION RATES

J.J. Gelfand, Princeton University, Graduate School, *205 Nassau Hall, Princeton, New Jersey* 08540 (DN875652; N00014-78-C-0721)

Rotational relaxation rates are, in general, very fast and difficult to measure. Since they are generally faster than otheer relaxation processes, they dominate the pressure broadening linewidths. Thus, the linewidths contain important relaxation rates with potential application in the modeling of gaseous molecular lasers and in energy transfer in a disturbed atmosphere. This is important to the naval areas of lasers, communication, and surveillance.

An optoacoustic spectrometer with high precision and sensitivity is presently being constructed. When this is finished, the linewidths for vibrational-rotational transitions in such molecules as HCl, CO, HF, and DF will be measured. These will then be analyzed to determine the rotational relaxation rates.

SUPPORTED BY U.S. Dept. of Defense, Navy, Office of Naval Research

4.0025, FUNDAMENTAL STUDIES ON TURBULENT SWIRLING JET IGNITION

W.A. Sirignano, Princeton University, School of Engineering & Applied Sciences, Dept. of Aerospace & Mechanical Science, *Box 430, Princeton, New Jersey* 08540 (DN975314; N00014-79-C-0300)

The object of this research is to develop understanding, via analysis and experimentation, of the basic phenomena affecting the ignition, flame stabilization, and combustion and to develop predictive techniques useful for actual combustor design. This information is needed to enhance future design of jet engines for military aircraft, ramjets and rockets.

Numerical integration of governing partial differential equations and laser Doppler velocimetry measurements in cold and hot flows. Present analytic work is utilizing several models of turbulence with different methods of solution and the results compared to experimental data. The governing time-averaged partial differential equations for turbulent, reactive, axisymmetric flows will be developed and the theory extended to obtain solutions for axisymmetric swirling flows. Concurrently, experimental concepts, utilizing a swirl generator with tangential injection of part of the fluid through slots into cylindrical ducts, is being developed to measure velocity correlations in cold swirling flows and flows with combustion.

SUPPORTED BY U.S. Dept. of Defense, Navy, Office of Naval Research

4.0026, NUCLEAR RADIATION EFFECTS ON FIBER OPTIC LINKS

S. Kronenberg, U.S. Dept. of Defense, Army, Electronics Research & Development Command, Electronics Technology & Devices Lab., *Fort Monmouth, Red Bank, New Jersey* 07703 (DA0D2926)

The objective of this effort is to define and verify tests anad test procedures permiting scientists to conclusively predict the performance of optical fibers under various radiation environments.

Tests will be identified, test procedures developed, key performance parameters determined, fibers procured, and tests conducted to validate authenticity and reproducibility.

SUPPORTED BY U.S. Dept. of Defense, Communications Research & Development Command, Center for Communications Systems

4.0027, FIELD AND ANALYTICAL ENGINEERING SUPPORT FOR THE SOUNDING ROCKET PROGRAM

H. Lawrence, New Mexico State University, Las Cruces Campus, Physical Science Lab., *P.O. Box 548, Las Cruces, New Mexico* 88070 (NAS 5-26332)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Goddard Space Flight Center

4.0028, ESTIMATION OF SYSTEM PARAMETERS FROM TRANSIENT ELECTROMAGNETIC RESPONSES

J.T. Cordaro, University of New Mexico, School of Engineering, Dept. of Electrical Engineering & Computer Science, *University Hill N.E., Albuquerque, New Mexico* 87106 (DF053660; AFOSR-78-3723)

AF function - the singularity expansion method can be used to compute transient electromagnetic responses in terms of a finite number of laPlace transform poles and residues. In a situation where an electromagnetic pulse (EMP) illuminates a finite body the poles in the resulting response are of two types, poles that characterize the natural behavior of the body and poles that characterize the incident field. Both types of poles are of importance in EMP test analysis. Efforts are currently under way to model aircraft structures so that EMP responses may be calculated analytically. Deficiency - at the present time there is no completely satisfactory way of comparing poles and residues computed from a model with those computed from a measured transient response. The reason is simply that the available techniques for computing poles and residues from real data are not adequate when the measurements are noisy or when ground reflections are present. Objective - the goal of the research proposed here is to develop and test a method for calculating the poles and residues from a noisy transient electromagnetic response. Contribution - this work will provide a useful tool in the understanding of electromagnetic coupling to structural materials.

The PI proposes that, instead of simply trying to approximate a given response by complex exponentials, one should try to subtract out the reflected component from the response. This will have to be done iteratively since the reflected response is not known initially.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

4.0029, STUDY CONTRACT FOR MULTIPLE ACCESS AND NETWORK STUDIES FOR NEXT GENERATION COMMUNICATIONS SATELLITES

H.E. Meadows, Columbia University, School of Engineering, Dept. of Electrical Engineering & Computer Science, *351 Engineering Ter., New York, New York* 10027 (NAS 3-22464)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Lewis Research Center

4.0030, TRANSONIC WING-BODY CALCULATIONS

D.A. Caughey, Cornell University, Ithaca Campus, Sibley School of Aerospace & Mechanical Engineering, *Ithaca, New York* 14850 (DN775078; N00014-77-C-0033)

The development of accurate methods for the prediction of the transonic flow fields about complex aircraft and missile configurations is essential for their design and optimization. The proposed research will develop finite-difference techniques for solving the complete potential equation for the transonic flow about three-dimensional configurations, such as wing-fuselage combinations.

The development of accurate predictive techniques for increasingly complex configurations is an evolutionary one. The planned research will extend the previous wing work of Jameson and Caughey to include the added complexity of a fuselage.

Emphasis will be devoted to methods for transforming the geometries to computational domains in which the boundary conditions can be accurately and efficiently incorporated. Concomitant problems associated with the transformational procedures (the flow is not approximately aligned with one of the coordinate directions at all points in the field) will be studied. The investigation will be conducted within the framework of the complete potential equation differenced in a non-conservative form.

SUPPORTED BY U.S. Dept. of Defense, Navy, Office of Naval Research

4.0031, ACOUSTIC WAVE EVALUATION OF SEMICONDUCTORS

P.K. Das, Rensselaer Polytechnic Inst., School of Engineering, Dept. of Electrical Engineering, *110 8th St., Troy, New York* 12181 (DF049830; AFOSR-77-3426)

AF function - solid-state microwave devices are essential components of Air Force command, control, communications and surveillance systems. Opportunity - methods for non-destructive testing microwave materials are presently inadequate. Objective - it is the objective of this research to develop and to perform non-destructive evaluation of III-V semiconductor materials using surface acoustic wave techniques. How work contributes - this research should provide a method to use routinely in testing non-destructively electronic materials after each step in device fabrication.

The interaction of acoustic surface waves in a piezoelectric substrate in the proximity of semiconductor charge carriers will be utilized to determine trap locations, surface and interface states, bulk and surface conductivity and mobility, and trap lifetimes by studying the attenuated output, and transverse acoustic-electric voltage in the presence of applied dc bias and different light wavelengths illuminating the semiconductor.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

4.0032, MULTIFREQUENCY RADAR CROSS-SECTION MEASUREMENTS

R.B. Mack, Syracuse University, Graduate School, *Steele Hall, Syracuse, New York* 13210 (DF905610; F30602-78-C-0083)

AF function - all-weather detection and identification. Deficiency - effective techniques for detection and identification require information on scattering properties of targets. Objective - this program will provide a newly designed facility for multifrequency scattering measurements of radar cross-sections. The installation is to be a part of the new facilities at the IPSWICH, MA field site planned for completion by the end of fiscal 79. How research contributes - the range will provide a modern, versatile facility for conducting radar experiments at 1 to x-band frequencies.

Task description - the task is to design a facility to serve as a multifrequency radar scattering measurement range. The range includes an anechoic room and will be used for both scattering and reflection measurements. The frequency range to be covered is 1 to x-band. As well as the design of the range, a list of desired auxiliary equipment is to be specified. Dr. Mack's experience in the field of radar scattering measurements - he is presently teaching a course on the subject - will assure a modern, versatile range representative of the most modern technology.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Rome Air Development Center

4.0033, OPERATIONAL RELIABILITY EXPERIENCE TO IMPROVE RELIABILITY OF AF ELECTRONIC SYSTEMS

E. Fiorentino, U.S. Dept. of Defense, Air Force, Rome Air Development Center, *Griffiss Air Force Base, Rome, New York* 13441 (DF707570)

This in-house effort will be concerned with (a) the collection from all Air Force data sources of information on the reliability of Air Force electronic comunication, comand and control, surveillance, navigation, and display equipment; and (b) analysis of these data to determine the present field reliability of these items and comparison of predicted, measured, and observed field failures.

The field failure data collected will be analyzed to define the scope and impact on the reliability problem. Principal 'contributors' such as parts, equipment design, and human influences will be investigated. The influence of major offenders or 'weak links' in the system will be defined. Effects of equipment characteristics such as power output, complexity, and other factors on reliability will be determined. Reports on the above information will be published and disseminated to interested personnel.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Rome Air Development Center

4.0034, CONFORMAL ARRAYS AND HEMISPHERICAL COVERAGE ARRAYS

J. McIlvenna, U.S. Dept. of Defense, Air Force, Rome Air Development Center, *Griffiss Air Force Base, Rome, New York* 13441 (DF903720)

To develop lightweight, inexpensive, flush-mounted and conformal antenna elements and arrays for aerospace use. Designs are specialized to offer enhanced scanning coverage over the full hemisphere.

To design and test elements and arrays in microstrips that provide increased pattern performance in the end-fire directions. To utilize new array geometries, such as the tent redome concept, in low drag designs, for airborne communication links.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Rome Air Development Center

4.0035, FUEL CHARACTER EFFECTS ON J-79 SMOKELESS COMBUSTOR

C. Gleason, General Electric Co., *1 Jimson Rd., Cincinnati, Ohio* 45215 (DF463590; F33615-79-C-2033)

Determine the effects of fuel characteristics (hydrogen content, end-point, viscosity, aromatic types) on a lean primary zone, J-79 combustor. Compare results with similar data for a rich primary zone J-79 combustor. Determine if the lean primary zone combustor is more fuel-tolerant than the rich primary zone combustor.

Through a sole-source contract to General Electric Co., perform tests on the smokeless combustor (lean primary zone) developed for the J-79. Both JP-4 and JP-8 are to be baseline fuels. Vary fuel hydrogen content, distillation end-point, aromatic types and concentrations. Compare test results with similar data already obtained for rich primary zone combustor.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Aero Propulsion Lab.

4.0036, INVESTIGATION OF THE BOUNDARY LAYER BEHAVIOR ON TURBINE AIRFOILS B

Unknown, Ohio State University, Columbus Campus, Graduate School, *190 N. Oval Dr., Columbus, Ohio* 43210 (DF464420)

Measure heat transfer to scale model turbine stators, paying particular attention to the pressure surface and to measure influence of upstream turbulence on heat transfer to the stators.

Stator models are mounted in the OSU large scale cascade facility. Three blade configurations will be tested. All have the same camber, but different axial distributions of camber and thickness.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Aero Propulsion Lab.

4.0037, CSEL SERVICE AND MAINTENANCE

B. Sexton, Systems Research Lab. Inc., *500 Woods Dr., Dayton, Ohio* 45432 (DF109100; F33615-77-C-1267)

The objective of this effort is to provide support for a unique Air Force facility, the Communication Systems Evaluation Laboratory, located at AFAL. This facility is used to evaluate various radio frequency (rf) systems, modulation systems, navigation systems and potential jamming threats to such systems. Current systems being supported are the E-4 CCC link with the AFSATCOM satellites, and the GBU-15 Glide Bomb video link evaluation. This effort is in support of PMD No. R-S2134-6, dated 1 Oct. 76.

The approach is to obtain the support of an on-site contractor to service and maintain the equipment in the CSEL facility.

Approximately four man-years of support are provided to accomplish this mission.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Avionics Lab.

4.0038, HIGH TEMPERATURE HEAT TRANSFER TEST PROGRAM

A.E. Hasue, U.S. Dept. of Defense, Air Force, Aero Propulsion Lab., *Wright Patterson A.F.B., Dayton, Ohio* 45433 (DF460310)

To test, analyze and evaluate hot section components for advanced turbopropulsion applications. Typical applications include evaluation of high temperature turbine vane/blade cooling schemes and testing of advanced materials and coatings. To analyze high gas and material surface temperature measurement concepts.

In the initial facility application, turbine vane cooling concepts are evaluated by mapping thermal contours of the vanes using infrared techniques. A color data pyrometer observes vane temperature while the desired test conditions are varied. Temperature and pressure measurement concepts are evaluated during vane tests.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Aero Propulsion Lab.

4.0039, CATHODOLUMINESCENCE STUDIES OF AMPHOTERIC DOPANTS IN GaAs

Y.S. Park, U.S. Dept. of Defense, Air Force, Avionics Lab., *Wright Patterson A.F.B., Dayton, Ohio* 45433 (DF117470)

The objective of this program is to attain a knowledge of the behavior of amphoteric dopants in epitaxial and semi-insulating GaAs with the goal of obtaining a better understanding of the thermal conversion of semi-insulating GaAs.

The work will utilize cathodoluminescence and Hall measurements as the principal techniques to analyze the characteristics of ion-implanted epitaxial and semi-insulating GaAs substrates. The behavior of amphoteric dopants such as Si or C will be studied by implantation into GaAs in order to elucidate the in- or out-diffusion mechanism and changes in the lattice location of amphoteric impurities. The effect of fabrication parameters on dopant type will be assessed. Samples will be prepared under differing implantation conditions in both semi-insulating GaAs and GaAs epi-layers. Parameters such as dose rate, target temperature, surface-encapsulants, and annealing conditions will be varied in preparation of the samples. Dual implantation will also be performed to determine conditions which produce N- or P-type activity in GaAs. Comparison of luminescence results with Hall results should provide considerable insight into the effect of implant and annealing conditions on the behavior of amphoteric dopants implanted in GaAs.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Avionics Lab.

4.0040, PROCESSING OF ADVANCED ELECTROMAGNETIC WINDOWS - CHEMICALLY VAPOR-DEPOSITED SILICON NITRIDE

R.A. Tanzilli, General Electric Co., Reentry & Environmental Systems Division, *3198 Chestnut St., Philadelphia, Pennsylvania* 19101 (DN675314; N00014-78-C-0107)

Future tactical missiles will need improved IR domes or radomes. Dual mode capabilities may also be desirable. Presently used materials are not suitable for such uses because severe operating conditions would be imposed upon them at levels beyond their useful capabilities. Improved materials must possess useful mechanical, thermal, optical, electrical and chemical properties and must also be fabricable. This task is aimed at materials processing, characterization and property determinations. The results will be used to evaluate the suitability of chemically vapor-deposited silicon nitride as an advanced dome material.

Work will continue along several directions. Deposition condition optimization is being studied for forming smooth flat-plate materials thicker than 5 mm at rates of 1 mm per hour; strength optimization via grain size control will be done by gas phase changes. The origins and control of absorption and scattering will be investigated for anisotropic crystalline alpha-Si3N4 and for isotropic amorphous CVD Si3N4. Key physical properties being evaluated include mechanical, thermal, optical, electrical and microstructural parameters.

SUPPORTED BY U.S. Dept. of Defense, Navy, Office of Naval Research

4.0041, DFS-SYSTEM INTEGRATION DEVELOPMENT PLAN

R.J. Crosbie, U.S. Dept. of Defense, Navy, Naval Air Development Center, Aircraft & Crew Systems Tech Directorate, *Warminster, Pennsylvania* 18974 (DN081195)

To develop a method for efficiently applying the unique capabilities of the dynamic flight simulator (DFS) in the investigation of man-machine interface problems in a realistic flight environment when addressing current/proposed Navy weapon system technologies.

(1) Thoroughly examine proposed plans for the development of a systems integration laboratory designed to provide an efficient method of addressing Navy weapon system technology problems in a common system facility. (2) Detail specific hardware, software, and functional requirements for integrating the DFS with the proposed laboratory. (3) Develop a plan for bringing the DFS system to a state of readiness for the proposed function.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Air Development Center

4.0042, ENERGY CONVERSION - ELECTRICAL MACHINE THEORY

W.J. Carr, Westinghouse Electric Corp., Research & Development Center, *3 Gateway Ctr., Pittsburgh, Pennsylvania* 15222 (DN223468; N00014-72-C-0432)

To develop a theory of AC loss mechanisms in twisted filimentary superconducting wires and to examine new machine concepts of interest to the Navy for propulsion.

Studies on the complex problem of AC losses in multifilament superconductors will be continued, with the object of designing stable low loss conductors which will allow a reduction in the refrigerator capacity needed for superconducting machinery, and allow wider naval applications for superconducting propulsion systems. Experiments to confirm these studies are being conducted. As a smaller part of the program, analysis will be continued on possibilities for novel machines, including D-C heteropolar superconducting machines.

SUPPORTED BY U.S. Dept. of Defense, Navy, Office of Naval Research

4.0043, ADVANCED ENGINE EMISSION MEASUREMENT TECHNIQUES

J.D. Few, Arnold Research Org. Inc., Arnold Engineering Development Center, *Arnold Air Force Base, Tullahoma, Tennessee* 37389 (DF407680)

New data using optical-in situ techniques indicate that existing probe-sampling methods may give erroneous results for NO and CO levels in engine exhaust. The objectives of this project are to document and explain the discrepencies between probe and optical measurements, and to develop compact optical systems for in situ measurement of NOX and CO in engine exhaust.

Joint funding with AFAPL of AEDC study to determine effect of probe materials and designs on NOX and CO measurements, and comparison with optical-in situ results. Funding of AEDC study to determine effect of axial distance from nozzle (and therefore temperature) on NOX and CO measurements by probe and optical techniques. Partial funding of AEDC simultaneous measurement of NO and NO2 by optical method. Partial funding of the development and testing of a gas filter correlation instrument for optical sensing of CO.

SUPPORTED BY U.S. Dept. of Defense, Engineering & Services Center, Engineering & Services Lab.

4.0044, DISTRIBUTED STORE AIRLOADS

W.B. Baker, U.S. Dept. of Defense, Air Force, Arnold Engineering Development Center, *Arnold Air Force Station, Tullahoma, Tennessee* 37389 (DF629000)

Air Force function - aircraft-STORES compatibility. Opportunity -structurally efficient STORE design and certification of STORES on aircraft. Goal - development of analytical and wind tunnel techniques to obtain distributed STORE airloads. How work contributes - provides more accurate airloads data to improve structural design of STORES and reduce flight envelope restrictions.

The approach will be to conduct pressure model and segmented STORE model wind tunnel tests to determine the best wind tunnel technique to obtain distributed airloads. Resulting accumulated data will be compared to the analytical results. The analytical technique will be based on the computer-aided missile synthesis (CAMS) computer program. This program will be modified to calculate the airloads distributed over the STORE while in an interference flow field. Existing and future flow field data will be used as inputs into this modified computer program.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Armament Lab.

4.0045, ENGINEERING ASPECTS OF PLASMA WAVES

I. Alexeff, University of Tennessee, Knoxville Campus, School of Engineering, Dept. of Electrical Engineering, *W. Cumberland Ave. S.W., Knoxville, Tennessee* 37916 (ENG78-03400)

An experimental and theoretical investigation of certain wave and particle problems in plasma dynamics is under investigation. Topics being studied include: 1. The effects of plasma boundaries on the absorption and reflection properties of ion-acoustic waves. 2. The characteristics of cold electrons injected in the troughs of ion-acoustic waves. 3. The potential effectiveness of time-of-flight isotope separation in a plasma separator. 4. Ignition and turn-off characteristics of plasma discharges in high voltage switching.

SUPPORTED BY U.S. National Science Foundation, Directorate for Engineering & Applied Science

4.0046, MULTISHAKER MODEL TESTING

R.R. Craig, University of Texas, Austin Campus, School of Engineering, Dept. of Aerospace Engineering & Engineering Mechanics, *200 W. 21st, Austin, Texas* 78712 (NAS 8-33980)

SUPPORTED BY U.S. National Aeronautics & Space Admin., George C. Marshall Space Flight Center

4.0047, ORBITAL MECHANICS OF LARGE SPACE STRUCTURES

B.E. Schutz, University of Texas, Austin Campus, School of Engineering, Dept. of Aerospace Engineering & Engineering Mechanics, *200 W. 21st, Austin, Texas* 78712

DESCRIPTION: Various applications using large structures in space have been proposed, including solar power stations and space colonies. Some of the proposals involve orbits which are resonant with the moon, the sun, the earth's gravitational field, etc. As a consequence, large amplitude oscillations occur in some cases which could significantly influence the selection of particular orbits for large space structures. Current analysis is concentrating on (1) general characteristics of orbital motion in these resonant cases, (2) ascertaining the existence of small amplitude motions, and (3) the general characteristics of the rotational motion of a large structure. This investigation represents a continuing line of research.

SUPPORTED BY University of Texas

4.0048, CONTROL OF PRECISION-POINTED STRUCTURES MOUNTED ON FLEXIBLE SPACE PLATFORMS

G.L. Goglia, Old Dominion University, School of Engineering, Dept. of Engineering, *5201 Hampton Blvd., Norfolk, Virginia* 23508 (NAG 1-102)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Langley Research Center

4.0049, HIGH POWER TRANSISTOR EVALUATIONS FOR ELECTRIC VEHICLE APPLICATIONS

F.C. Lee, Virginia Polytechnic Inst. & State University, School of Engineering, Dept. of Electrical Engineering, *Blacksburg, Virginia* 24061 (NAG 3-99)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Lewis Research Center

4.0050, COMPATIBLE MILITARY/COMMERCIAL AIRCRAFT MULTIPLEX DATA BUS SYSTEM

M.D. Schule, Boeing Co., Boeing Aerospace, *7555 E. Marginal Way S., Seattle, Washington* 98124 (DN081137; N62269-79-C-0339)

The objective of this task is to generate and provide the required documentation which will allow the Navy to propose a multiplex data bus structure which can be accepted by both the military and commercial avionics and aircraft industry for implementation within military commercial aircraft. This contracted effort supports work unit ZC101, Agency Accession Number CN 081123.

This effort is to be accomplished within the context of existing tri-service MIL-STD-1553B and Commercial ARNIC data bus standards and specification. Additionally, work is to be performed within the framework of existing tri-service and industry multiplex data bus organizations and committees who have extensive experience and background in the area of data dus standards, technology, and implementation.

SUPPORTED BY U.S. Dept. of Defense, Naval Air Development Center, Communication Navigation Tech Directorate

4.0051, RESEARCH ON FLOW PHENOMENA RELATED TO HIGH POWER LASERS

W.H. Christiansen, University of Washington, School of Engineering, Dept. of Aeronautics & Astronautics, *206 Guggenheim Hall, Seattle, Washington* 98105 (DF053980; F49620-79-C-0020)

AF function - high energy lasers. Opportunity - improve our understanding of the flow phenomena associated with modern high-power continuous wave gas lasers. Objective - develop new fundamental concepts for the interaction of laser radiation with flow and search out new approaches to improve performance. How work contributes - detailed quantitative understanding of fluid flow-laser radiation interaction will allow design tradeoffs which optimize high power gas lasers performance.

A combined analytical and experimental program is being conducted. The proposed work will include the study of the interaction of the aerodynamics and discharge phenomena in flow lasers, the study of fluid optics involving the use of flow as an optical control element, a study concerned with the phenomena involving shear layers in nonequilibrium and reacting gases in a lasing cavity, and a study on pressure recovery systems applicable to lasers.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

4.0052, EDGE FUNCTION ANALYSIS

P.M. Quinlan, National University of Ireland, University College at Cork, *Cork, Ireland* (DF289830; AFOSR-79-0075)

AF function - structural design/analysis of aerospace vehicles. Deficiency - present inability to mathematically represent large structural sections in an efficient, inexpensive fashion; present analysis methods are applied primarily to structural details and areas of high stress concentration. How research contributes - it will improve the accuracy and lower the cost of structural analyses for aerospace vehicles.

Professor Quinlan is developing the edge function method for structural analysis methods applicable to aircraft wing structures and star-shaped propellant grains. In addition to his own research, he has access to data from other agencies and institutions on the application of EFM to specific areas such as vibration, thick plate and fracture problems. His recent advances in 3-d stress analysis will be extended to include ellipsoidal shaped cavities in prismoidal bodies. He will also apply the EFM to vibrations in isotropic, orthotropic and geolotropic plates. He will

visit USAF installations to conduct seminars and provide consultative guidance to structural design scientists.

SUPPORTED BY U.S. Dept. of Defense, Air Force, European Office of Aerospace Research & Development

4.0053, FINITE ELEMENT METHODS IN FLUID DYNAMICS
N. Geffen, Tel Aviv University, *155 Herzl St., Tel Aviv, Israel* (DF048990; AFOSR-77-3345)

AF function - aerospace vehicles. Opportunity - both present and future Air Force aerospace vehicles will be required to fly at high speeds and have an ability to maneuver at all speeds. This will require that new and improved engineering design and analysis methods be developed throughout the total speed regime for the precise engineering determination of the performance and system capabilities of these vehicles. Objective - this research will attempt to develop new methods for fluid dynamical analysis using high speed computers, methods which circumvent the disadvantages of currently employed machine algorithms. How work contributes - the ability to perform aerodynamic calculations about complex (real) shapes using finite element methods which are becoming standard in structural analysis could lead to great improvements in efficient use of computers as engineering design and analysis tools. Resolutions of the variational problems underlying the use of such finite elements will do much to bolster engineering confidence in the (numerical) finite element methods, thereby giving the engineer an added and vital tool for use in predicting the 'grand ensemble' vehicle flow field.

This research will investigate the possibility and feasibility of using variational formulations to obtain finite element analysis and procedures for the solution of quasi-linear hyperbolic and mixed initial value problems, with application to unsteady flow about bodies, time-dependent simulation of aerodynamic phenomena in all speed ranges, steady transonic flows (including the case of the super-critical wing) and to internal gasdynamic flows (e.g., cascades and inlets).

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

GEOSCIENCES

Includes Geosciences (general); Earth Resources; Energy Production and Conversion; Environment Pollution; Geophysics; Meteorology and Climatology; and Oceanography. For Related Information See Also Space Sciences.

5.0001, APPLICATION OF AEROSPACE DYNAMIC MODELING TECHNIQUES OF CIVIL ENGINEERING STRUCTURES
R.C. Johnson, Auburn University, School of Engineering, Dept. of Civil Engineering, *Auburn, Alabama* 36830 (NAS 8-34130)

SUPPORTED BY U.S. National Aeronautics & Space Admin., George C. Marshall Space Flight Center

5.0002, ENHANCEMENT OF LANDSAT DATA FOR THE ANALYSIS OF SUBARCTIC WETLANDS
K.G. Dean, University of Alaska, Fairbanks Campus, Geophysical Inst., *Fairbanks, Alaska* 99701 (NCA 2-20002)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Ames Research Center

5.0003, CHATANIKA ELELCTRIC FIELD STUDIES
R.R. Vondrak, S R I International, *333 Ravenswood Ave., Menlo Park, California* 94025 (DF582310; F19628-79-C-0038)

AF function - satellite communication, navigation systems. Deficiency - inadequate knowledge of ambient electric fields causing effects which seriously degrade AF systems at high latitudes. Objective - to determine the electrodynamic state of the high latitude ionosphere. How research contributes - improves knowledge of physical processes affecting the high latitude ionosphere leading to realistic predictive models of ionospheric irregularities and circulating current systems.

Correlative data from the Chatanika incoherent scatter radar facility located at 65 degrees N latitude and the Air Force S3-2 satellite are analyzed and studied to determine the ambient electric field configuration, currents and height integrated conductivity in relation to ionospheric features such as diffuse aurora, discrete arcs and the plasma trough.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Geophysics Lab.

5.0004, ENVIRONMENTAL DISTURBANCE EFFECTS ON IONOSPHERIC SYSTEMS (PART OF BLOCK PROGRAM FOR EM/EO PROPAGATION)
P.E. Argo, U.S. Dept. of Defense, Navy, Naval Ocean Systems Center, Environmental Sciences Dept., *San Diego, California* 92152 (DN034000)

Develop near-earth environmental disturbance forecasting models which use sensors such as the Navy SOLRAD satellite to predict degradation effects on military communication, navigation, surveillance and other command control systems. Develop these models in support of the Prophet development test and evaluation task. Produce theoretical and applied models along with the software necessary for real-time assessment and prediction of the impact on naval C3 systems of variations in the near-earth environment.

Use theoretical considerations of the processes that affect electromagnetic propagation to develop applied emperical and semi-emperical models which can be used to assess and forecast the effect of environmental factors on various naval electromagnetic systems.

SUPPORTED BY U.S. Dept. of Defense, Naval Material Command, Support Technology Div.

5.0005, MICROWAVE MEASUREMENT OF SNOW WETNESS ACCUMULATION
D.J. Angelakos, University of California, Berkeley Campus, Electronics Research Lab., *Berkeley, California* 94720 (NCA 2-50006)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Ames Research Center

5.0006, EDF/AFOS
D. Haugen, U.S. Dept. of Commerce, National Oceanic & Atmospheric Admin., Environmental Research Lab., *Boulder, Colorado* 80302 (8AA78484)

PROJECT OBJECTIVE: Establish a hardware/software data interface between the data acquisition system of the PROFS Exploratory Development Facility (EDF) and the National Weather Service AFOS system.

CURRENT YEAR PLAN: Purchase, install, and operate an AFOS WSO-station configuration terminal. Complete hardware/software system necessary to integrate AFOS data with satellite, radar, and surface network data for nowcast/forecast products.

SUPPORTED BY U.S. Dept. of Commerce, National Oceanic & Atmospheric Admin., Environmental Research Lab.

5.0007, BAO TOWER INSTRUMENTATION
J.C. Kaimal, U.S. Dept. of Commerce, National Oceanic & Atmospheric Admin., Environmental Research Lab., *Boulder, Colorado* 80302 (8AA71675)

PROJECT OBJECTIVE: Update BAO instrumentation and maintain current instruments.

CURRENT YEAR PLAN: Achieve 24-hour/day climatological operation.

PROGRESS REPORT: Reached operation status. Conducted an international intercomparision experiment of low-level sounding techniques and several smaller experiments.

SUPPORTED BY U.S. Dept. of Commerce, National Oceanic & Atmospheric Admin., Environmental Research Lab.

5.0008, HAMEC - HAWAII MESOSCALE ENERGY AND CLIMATE PROJECT

Nickerson, U.S. Dept. of Commerce, National Oceanic & Atmospheric Admin., Environmental Research Lab., *Boulder, Colorado* 80302 (8G130514)

PROJECT OBJECTIVE: The preliminary objective is the gathering of data for the initialization and validation of the APCL Mesoscale warm rain model.

CURRENT YEAR PLAN: A NOAA P3 aircraft will be used to sample the airflow and cloud systems over the island of Hawaii during a two-week period beginning on or about 12 June, 1980. Standard P3 instrumentation will be augmented by additional air chemistry and cloud microphysical sampling equipment to be purchased, manufactured, or borrowed for this program.

PROGRESS REPORT: An initial program Operations Plan has been prepared and a detailed planning phase is underway.

SUPPORTED BY U.S. Dept. of Commerce, National Oceanic & Atmospheric Admin., Environmental Research Lab.

5.0009, STUDENT RESEARCH

A. Smith, U.S. Dept. of Commerce, National Oceanic & Atmospheric Admin., Environmental Research Lab., *Boulder, Colorado* 80302 (8DJ41190)

Research effort directed towards processes for solar-terrestrial phenomena to aid in the prediction of time and spatial occurrence of solar disturbances and their effects on the solar-terrestrial and near-earth environment.

SUPPORTED BY U.S. Dept. of Commerce, National Oceanic & Atmospheric Admin., Environmental Research Lab.

5.0010, ATMOSPHERIC STUDIES

T.E. Van Zandt, U.S. Dept. of Commerce, National Oceanic & Atmospheric Admin., Environmental Research Lab., *Boulder, Colorado* 80302 (8DJ41451)

PROJECT OBJECTIVE: Study of atmospheric physics, particularly the dynamics of the atmosphere from the troposphere up to the ion-thermosphere (approximately 100 km), using data from sensitive Doppler radars.

CURRENT YEAR PLAN: Observational and theoretical study of buoyancy (acoustic-gravity waves in the troposphere and lower stratosphere, using velocity fluctuation observations from the Sunset Radar. Study of turbulence and turbulent transport in the atmosphere, particularly in the troposphere and lower stratosphere. Study of the relation between Fresnel reflection of radar waves and stable regions of the atmosphere.

PROGRESS REPORT: Our model for the calculations of profiles of refractivity turbulence structure constant from rawinsonde data has been further developed. The modulation of turbulence by buoyancy waves has been observed and analyzed. Radar reflections from stable layers in the atmosphere have been studied.

SUPPORTED BY U.S. Dept. of Commerce, National Oceanic & Atmospheric Admin., Environmental Research Lab.

5.0011, STUDY OF THE RESPONSE OF UPPER ATMOSPHERE PARAMETERS TO VARIATION OF SOLAR ACTIVITY (UARS)

J. London, University of Colorado, Boulder Campus, School of Arts & Sciences, Dept. of Astro Geophysics, *1200 University Ave., Boulder, Colorado* 80302 (NAS 5-26303)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Goddard Space Flight Center

5.0012, SEASAT SAR IMAGERY PRODUCTS

I. Jurkevich, U.S. Dept. of Defense, Navy, Naval Research Lab., *4555 Overlook Ave. S.W., Washington, District of Columbia* 20375 (DN880325)

To provide ONR/Code 460-designated principal investigators in need of SEASAT SAR imagery products the opportunity to selectively acquire such imagery in limited quantities, suitable for supporting their specific research programs and objectives.

Acquire selected raw data frames of the SEASAT SAR experiment as received at the NASA STADAN STES, process them in the NRL Digital Image Processing Laboratory (DIPL), and offer them to the user community in one of the following forms: computer-compatible tapes (CCT), hard copy imagery (HCI - film products), or a combination of both. The DIPL will also attempt to furnish enhanced hard copies of the imagery-per-user specifications. Enhancement options include linear and nonlinear grey scale stretching or compression, brightness contouring, edge or line enhancement, color mapping, color composites, magnification mosaicing binarization, histogram construction, annotation and pixel by pixel manipulation and read-out throughout an image scene.

SUPPORTED BY U.S. Dept. of Defense, Navy, Office of Naval Research

5.0013, SATELLITE OCEANOGRAPHY IN SUBTROPICS

O. Brown, University of Miami, D.H. & Lewis Rosenstiel School of Marine & Atmospheric Sci., Dept. of Meteorology & Physical Oceanography, *4600 Rickenbacker Cswy., Coral Gables, Florida* 33149 (DN975861; N00014-75-C-0173)

Remote sensing by satellite offers the possibility of synoptically monitoring the surface conditions of the ocean from input to oceanographic and sonar prediction models. These observations are not possible any other way on any significant scale. This project attempts to relate, quantitatively, satellite infrared sensor returns with ocean thermal processes, in order to interpret and expand satellite data coverage.

Satellite thermal imagery will be collected and processed in conjunction with independently collected in situ ocean data. Algorithms will be developed for the interpretation of the satellite data in terms of oceanic processes, and the resulting sea surface temperature fields analyzed.

SUPPORTED BY U.S. Dept. of Defense, Navy, Office of Naval Research

5.0014, THE PREDICTION OF THE DYNAMICAL IMPACT OF CHANGES IN STRATOSPHERE OZONE - PHASE 1 (UARS)

D.M. Cunnold, Georgia Inst. of Technology, School of Geophysical Sciences, *Atlanta, Georgia* 30332 (NAS 5-26304)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Goddard Space Flight Center

5.0015, FOG FORMATION MECHANISMS

A.H. Woodcock, (No Performing Organization Reported), *Hawaii* (DN323054; N00014-79-C-0169)

The objective of this research is to establish the mechanism and the circumstances by which fog forms on salt particles at sea. The work is applicable to improvement of fog forecasting techniques and to studies of fog dissipation techniques.

Sea salt nuclei are sampled at sea at the surface and aloft by light aircraft. Both number density and weight distribution (size) are determined by means of activation analysis by Dr. R. Duce of the University of Rhode Island. Computations are made of the drop sizes and the liquid water content of fogs that would be formed on the nuclei under assumptions of 100% r.h. and one-hour growth time.

SUPPORTED BY U.S. Dept. of Defense, Navy, Office of Naval Research

5.0016, APPLICATION OF MAGSAT TO LITHOSPHERIC MODELING IN SOUTH AMERICA (PROCESSING & INTERPRETATION OF MAGNETIC & GRAVITY ANOMALY DATA)
W.J. Hinze, Purdue University, School of Science, Dept. of Geosciences, *Executive Bldg., West Lafayette, Indiana* 47907 (NAS 5-26287)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Goddard Space Flight Center

5.0017, SENSOR DEVELOPMENT FOR BASIC SURFACE OBSERVATIONS - VISIBILITY SENSOR
D.T. Acheson, U.S. Dept. of Commerce, National Oceanic & Atmospheric Admin., National Weather Service, Systems Development Office, Equipment Development Laboratory, *8060 13th St., Silver Spring, Maryland* 20910 (8AA81024)

OBJECTIVE: To develop a visibility sensor capable of measuring visibility over the range of 0.1 to 50 kilometers.

APPROACH: Evaluate EG&G Forward Scatter Meter (FSM). Complete design and evaluate a FSM of EDL design. Investigate laser backscatter devices as candidate prevailing visibility sensors.

PROGRESS: The fabrication of a telephotometer, to be used as a visibility standard, is complete. A forward scatter meter (FSM) was designed and fabricated. Two EG&G FSM's were acquired and one installed at the Gramax Building for an informal evaluation.

SUPPORTED BY U.S. Dept. of Commerce, National Weather Service, Systems Development Office

5.0018, DESIGN STUDIES FOR THE SHUTTLE TIME AND FREQUENCY TRANSFER EXPERIMENT
C.O. Alley, University of Maryland, College Park Campus, School of Arts & Sciences, Dept. of Physics, *College Park, Maryland* 20742 (NAS 8-33798)

SUPPORTED BY U.S. National Aeronautics & Space Admin., George C. Marshall Space Flight Center

5.0019, PIEZOELECTRIC ACCELEROMETER FOR SPACE SHUTTLE TEST
D.H. Fryklund, Accumetrics Corp., *Cambridge, Massachusetts* (DF583520; F19628-79-C-0095)

AF function - airborne surveillance, target acquisition. Deficiency - atmospheric density variations with time and space cannot be predicted with sufficient accuracy. Objective - direct measurement of atmospheric density by satellite-borne accelerometers. Correlation of these results is made with other satellite data and with solar-geophysical parameters to develop improved atmospheric models. How research contributes - permits accurate determination of Air Force satellite ephemerides and development of accurate density forecasting techniques.

A satellite triaxial piezoelectric accelerometer will be designed, fabricated, tested and calibrated. The instrument will be flown on one of the space transportation system orbital flight tests scheduled for flight in December, 1979. The purpose of the instrument is to provide information on the orbital acceleration environment. In addition to monitoring the magnitude and frequency distribution of onboard generated accelerations, aero-dynamic drag effects will be measured. Atmospheric density is directly proportional to drag. NASA has modified the flight test time-line to turn the instrument on during periods of interest to AFGL.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Geophysics Lab.

5.0020, ANALYSIS OF SATELLITE SENSOR DATA
D.E. Delorey, Boston College, Chestnut Hill Campus, Graduate School, *140 Commonwealth, Chestnut Hill, Massachusetts* 02167 (DF275460; F19628-76-C-0190)

AF function - airborne surveillance, target acquisition. Deficiency - atmospheric density and composition variations with time and space cannot be accurately predicted. Research - direct density and composition measurements with solar and geophysical parameters. How research contributes - permits development of accurate models to be used in forecasting techniques. Mathematical techniques and computer routines are developed to process satellite attitude and sensor data to calculate parameters to provide increased knowledge of atmospheric properties.

Develop and implement computer routines and techniques for the continued reduction of raw digital data from sensor outputs to vehicle attitude, sensor position vectors and associated ionospheric parameters.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Geophysics Lab.

5.0021, SATELLITE DENSITY SYSTEMS
C. Accardo, Epsilon Lab. Inc., *Bedford, Massachusetts* 01730 (DF580470; F19628-77-C-0062)

AF function - low altitude operational satellites, airborne surveillance, ballistic nuclear weapon delivery. Deficiency -inaccuracies in spacecraft's orbital track and trajectories due to insufficient knowledge of atmospheric density variability at critical altitudes. Objective - acquisition of atmospheric density measurements, define, analyze, correlate and relate results to solar and geophysical phenomena. How research contributes - permits direct accurate measurements of density providing inputs needed in the development and upgrading of forecasting techniques.

Instrumentation using ionization gauges along with a motor-activated air stream modulator has been developed for use onboard the S77-2 spacecraft. These flight units are capable of measuring directly atmospheric density and also potentially atmospheric temperature and spacecraft altitude.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Geophysics Lab.

5.0022, INTERFEROGRAM DATA ACQUISITION SYSTEM FOR BALLOON-BORNE CRYOGENIC INTERFEROMETER
J.L. Pritchard, Idealab Inc., *Union St., Franklin, Massachusetts* 02038 (DF248480; F19628-77-C-0039)

AF function - surveillance, advanced infrared detection system. Deficiency - lack of high-resolution data of stratospheric emittance in infrared. Objective - to acquire and handle interferogram signal from cryogenically operated interferometer in balloon-borne environment. How research contributes - an instrument sensitive enough to measure stratospheric emission will be made ready for a balloon-borne operation.

A system for acquiring and handling an interferogram signal from a cryogenically operated high-resolution IR interferometer will be designed and fabricated. Tests for interfacing will be conducted to see whether the full sensitivity of the instrument will be achieved to insure a detection of the stratospheric emission for a proposed balloon-borne experiment.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Geophysics Lab.

5.0023, AURORAL CORRELATION STUDIES
G. Davidson, Photometrics Inc., *Lexington, Massachusetts* 02173 (DF582620; F19628-79-C-0066)

AF function - infrared optical detection systems. Deficiency - lack of knowledge of auroral atmospheric processes controlling infrared backgrounds. Objective - correlate visible and infrared emission measurements of auroral backgrounds. How research contributes - an analysis of existing auroral data will provide insight into the spatial and temporal characteristics of auroral backgrounds which can affect surveillance systems.

Calibrate, analyze, and correlate auroral data measured by a DMSP satellite, ground-based photometers, and aircraft all-sky cameras. By comparing simultaneous data from these sources, a spatial/temporal model of infrared auroral emissions can be inferred from known visible auroral structure.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Geophysics Lab.

5.0024, INSTRUMENTATION DEVELOPMENT FOR LASSII EQUATORIAL MEASUREMENTS
Unknown, Tri Con Associates Inc., *Cambridge, Massachusetts* (DF581830; F19628-78-C-0150)

AF function - maintain communications between Air Force units during periods of small-scale ionospheric irregularities. Opportunity -model can be developed to provide inputs to systems designer to mitigate the effects of small-scale ionospheric irregularities on VHF/UHF transionospheric radio signals. Objective - develop an instrument capable of making positive ion composition measurements with a very high spatial resolution at satellite velocity. How research contributes -provides measurements essential to an understanding of the physical-chemistry and transport processes involved in the creation of ionospheric irregularities.

A quadruple mass spectrometer instrument capable of making positive ion composition measurements with a spatial resolution of 3 meters at satellite velocity shall be developed. Three such instruments shall be fabricated for ensuing flights on STP program NRL-sponsored LASSII satellites. This contract concerns itself with the design, fabrication and testing of the electronics portions of the experiment in support of in-house work unit 2310G305.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Geophysics Lab.

5.0025, CLOUD ANALYSES FROM DMSP IMAGERY
J.T. Bunting, U.S. Dept. of Defense, Air Force, Geophysics Lab., *L.G. Hanscom Field, Bedford, Massachusetts* 01731 (DF581490)

AF function - weather observing, analysis and forecasting for military operations. Deficiency - lack of adequate information to meet military weather support requirements. Objectives - to evaluate methods for estimating cloud information from satellite imagery and to develop an improved data processing plan for use in the AFGWC 3-dimensional neph-analysis. How development contributes - makes possible the real-time use of high-resolution satellite imagery in operational analysis and forecasting to satisfy requirements of AWS TN 2-75.

Under in-house work unit 86281202 (terminated for administrative purposes) several interrelated techniques were identified which offer potential improvement in extracting cloud information from high resolution satellite imagery. These techniques will be developed in order that improved automated processing procedures can be presented to AFGWC for use in the 3-dimensional neph-analysis program. These techniques include discrimination of cloud type based on Fourier analyses, bit-reduction algorithms to compress images to reduce computer requirements and application of multispectral data to obtain information on cloud structure, cloud phase and precipitation.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Geophysics Lab.

5.0026, MEASUREMENT OF TIME-DEPENDENT PARAMETERS OF STRATOSPHERIC TURBULENT LAYERS OVER LEVEL TERRAIN
R.E. Good, U.S. Dept. of Defense, Air Force, Geophysics Lab., *L.G. Hanscom Field, Bedford, Massachusetts* 01731 (DF581150)

AF function - provide data to predict if there is a significant change in the environmental quality of the stratosphere as a result of flight of USAF aircraft and missiles. Deficiency - existing data on stratospheric transport are insufficient to accurately predict changes in stratospheric composition from small perturbations caused by aircraft and missile exhaust products. Objective - conduct and analyze balloon-borne observations of the characteristics of turbulence layers. How research contributes - measurements of the turbulence characteristics over level terrain, away from mountains will be compared to previous measurements over mountains. These data will then be used to derive representative mixing coefficients and stratospheric pollution residence times over the United States. This will result in more precise environmental impact assessment of AF flight operations.

A balloon platform is used to carry a corona turbulence sensor that measures the intensity and spectral characteristics of turbulence layers. The balloon will initially be allowed to rise to 90,000 ft., producing a vertical record of the location of turbulence layers. The balloon will then be forced to descend so to float in a turbulent layer for several hours to observe the time history of the turbulent layer. This will be repeated several times during the estimated ten-hour mission. A total of four balloon flights are planned with launches from Watertown, S. Dakota. Two flights will be made in early March and two flights during the summer to cover the westerly and easterly flow conditions. Additional turbulence data will be obtained with piggy-back experiments flown on the BAMM program. A gas tracer payload developed and tested under LDF funds will be refurbished for four flights to obtain turbulence transport data.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Geophysics Lab.

5.0027, MM RADIOMETER IMPROVEMENT
D.A. Guidice, U.S. Dept. of Defense, Air Force, Geophysics Lab., *L.G. Hanscom Field, Bedford, Massachusetts* 01731 (DF580840)

AF function - communications and surveillance. Deficiency -techniques to forecast the proton energy spectra of solar flarebursts require sensitive mm-wavelength observations. Present mm instrumentation (35 GHz) at Sagamore Hill is below state-of-the-art, a 35 GHz radiometer was not included in current RSTN equipment. Objective - to upgrade the Sagamore Hill mm-wavelength patrol equipment to improve sensitivity; this will then serve as the baseline for other RSTN units as needed. How research contributes - equipment upgrading and resulting improved sensitivity will lead to a more complete utilization of collected data for prediction.

The approach is to investigate the suitability, procure, test, and incorporate wide-band (greater than 100 MHz) intermediate-frequency components into the Sagamore Hill mm-wavelength radiometric instrumentation. Sensitivity will also be improved by incorporating suitable low-noise and/or low-loss waveguide components into the existing radiometer.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Geophysics Lab.

5.0028, AUTOMATED IONOSPHERIC DISTURBANCE MONITORING
W.N. Hall, U.S. Dept. of Defense, Air Force, Geophysics Lab., *L.G. Hanscom Field, Bedford, Massachusetts* 01731 (DF584670)

AF function - communications, surveillance, and navigation. Deficiency - ionospheric monitoring and specification for USAF by Air Weather Service is limited by data quantity and cost of data acquisition. Objective - to develop automated techniques for detection and evaluation of ionospheric disturbances using digital ionosondes, magnetometers, and riometers. How research contributes - development of automated techniques will offset data base erosion, allow consideration of additional data sources, and improve timeliness, quantity, and quality of data supplied to Air Force Global Weather Central.

Procedures for determining the magnetic q index will be developed and installed in the SESSDAC (Space Environmental Support System Data Communicator) at the AFGL Goose Base ionospheric observatory in Canada. The q index has proved effective in describing high latitude phenomena such as the auroral oval. Methods for automated analysis of riometer data will be developed and installed in SESSDAC. Previously developed methods for automated determination of ionospheric parameters from compressed digisonde data will be extended to include detection and evaluation of typical high latitude disturbances at GBIO. The determination of true height electron density profiles automatically in SESSDAC using the compressed digisonde data will be studied.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Geophysics Lab.

5.0029, OPTICAL MISSION FROM CONTINUOUS AURORA
D.E. Paulsen, U.S. Dept. of Defense, Air Force, Geophysics Lab., *L.G. Hanscom Field, Bedford, Massachusetts* 01731 (DF584410)

AF function - transionospheric ranging and communications, remote ionospheric monitoring, missile surveillance and tracking. Deficiency -relationship between optical emissions and electron density profile is not understood well enough to develop remote satellite monitoring of the auroral oval and mid-latitude ionosphere. Auroral emission profiles needed for missile surveillance backgrounds. Objective - to measure vertical distributions of optical emissions from 130 to 560 nanometers in relation to electron density profiles. How research contributes -provides observations required to enable development of techniques for remote sensing of the ionosphere. Provide in situ uv background information to compare with previous satellite observations.

Vuv, uv, and vis (130 to 560 nanometers) optical emissions will be measured in continuous aurora using several rocketborne spectrometers. Zenith column spectral steradiancy will be measured as the rocket passes through the auroral E-layer on both up-leg and down-leg. Correlations between optical emission density profile and electron density profile will be studied to select optimal wavelengths for remote ionospheric modeling and monitoring.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Geophysics Lab.

5.0030, S3-TRAPPED PROTON FLUX MEASUREMENT
A.G. Rubin, U.S. Dept. of Defense, Air Force, Geophysics Lab., *L.G. Hanscom Field, Bedford, Massachusetts* 01731 (DF248920)

AF function - reliability, cost-effectiveness, lifetime and survivability of operations space systems. Deficiency - knowledge of the energetic particle environment necessary to adequately predict the reliability and lifetime of space systems. Objective - to determine the transient and steady-state energetic particle environment and to indicate possible effects on spacecraft performance and lifetimes. How research contributes - an extended data base from AF satellites will be used to construct realistic static and dynamic models of the near-earth particle environment.

Data from the S3-3 satellite currently on magnetic tapes will be sorted according to magnetic field, location and time. After background correction, particle population will be compared to previously available data. Since S3-3 data are collected from higher altitudes than previous satellites, data will be available for some regions and at some energy ranges not previously available. For previously unobserved phenomena, comparisons will be carried out employing magnetospheric dynamical theories.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Geophysics Lab.

5.0031, SCATHA LOW ENERGY PLASMA ANALYSIS
M. Smiddy, U.S. Dept. of Defense, Air Force, Geophysics Lab., *L.G. Hanscom Field, Bedford, Massachusetts* 01731 (DF583230)

AF function - surveillance, communication, navigation and spacecraft charging. Deficiency - inadequate knowledge of the electrical properties of the magnetosphere and of the interaction of a satellite with the environmental plasma at synchronous altitudes. Objective - to determine the role of low energy particles in spacecraft charging at synchronous altitudes. How research contributes - permits improved military space vehicle design for communication and surveillance systems. Provides understanding of dynamical processes in the magnetosphere and contributes to the understanding and solution of spacecraft charging problems.

The data from low energy sensors flown aboard the SCATHA, P78-2 satellite will be analyzed and synthesized to distinguish the major sources of low energy particle flow to and from the vehicle. The effects that ion/electron gun operation and spacecraft eclipse conditions have on the vehicle potential will be determined. Special coordinated studies will be carried out to investigate current flow and vehicle charging in disturbed conditions.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Geophysics Lab.

5.0032, SATELLITE INSTRUMENTATION FOR HIGH ENERGY PARTICLES
G.K. Yates, U.S. Dept. of Defense, Air Force, Geophysics Lab., *L.G. Hanscom Field, Bedford, Massachusetts* 01731 (DF580070)

AF function - navigation, communication and surveillance. Deficiency - inaccurate environmental specification for hardness of microelectronic components will result in insufficient criteria for military satellite systems. Objective - to design, test and calibrate high energy particle and magnetic flux detectors for satellite observations. How research contributes - direct measurement of the energetic particle environment in space will lead to a useful model resolving uncertainties in calculations of radiation hardening requirements.

Designs of state-of-the-art instruments for measuring high energy particles and magnetic flux will be completed. Fabricated instruments acquired under contractual work units supporting this task will be tested and calibrated in preparation for satellite integration.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Geophysics Lab.

5.0033, ATMOSPHERIC RESPONSE TO LATITUDINAL VARIATION OF TURBULENCE
S.P. Zimmerman, U.S. Dept. of Defense, Air Force, Geophysics Lab., *L.G. Hanscom Field, Bedford, Massachusetts* 01731 (DF582860)

AF function - communications, satellite surveillance and satellite orbit prediction. Deficiency - inadequate knowledge of the upper atmosphere, particularly its response to natural and man-made disturbances. Objective - to measure turbulent transfer coefficients in the atmosphere and to develop improved theoretical neutral-ionic model atmospheres. How research contributes - following solar proton events and nuclear detonations, radio communications are interrupted and missiles and satellites are lost from radar view. Improved models that can predict ionospheric perturbation effects can aid in the improvement of communications and tracking of vehicles. Improved models of the neutral atmosphere will result in more accurate predictions of system satellite ephemerides.

The latitudinal variation of measured turbulence, in conjunction with atmospheric pressure gradients and gravitational forces, controls the behavior of the mean mass motion in the thermosphere. This in turn affects the in situ variations of the neutral constituents as well as the ionic species which are also controlled by the earth's magnetic field. To examine the atmospheric response to these stimuli and to other perturbations such ion turbulence, a three-dimensional model of the structure and dynamics of the mesosphere and thermosphere will be developed. Concurrent with this effort, an existing one-dimensional neutral-ionic atmospheric model will be used to examine thermospheric effects of turbulence over northern latitudes and over the equator.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Geophysics Lab.

5.0034, DEFINITION PHASE OF THE HIGH RESOLUTION DOPPLER IMAGE (HRDI) FOR THE UPPER ATMOSPHERE RESEARCH SATELLITES PROGRAM (UARS)
P.B. Hays, University of Michigan, Ann Arbor Campus, School of Engineering, Dept. of Atmospheric & Oceanic Science, *Ann Arbor, Michigan* 48104 (NAS 5-26169)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Goddard Space Flight Center

5.0035, REMOTE OCEAN SUBSURFACE TEMPERATURE PROFILER (ROSTEP)
J. Guagliardo, U.S. Dept. of Defense, Navy, Naval Ocean Research & Development Activity, Naval Oceanographic Lab., *Bay St. Louis, Mississippi* 39529 (DN894445)

The fundamental problem is to develop a remote sensing capability that measures temperatures below the surface of the ocean. These measurements will provide quantitative data on air-sea energy exchanges which support meteorological and oceanographic prediction models and also as inputs for sound

velocity calculations to predict performance of tactical and strategic acoustic weapons systems.

Utilize the fact that the Raman spectrum centroid shifts with the temperature of the medium, conduct a system analysis for establishing system parameters of a model laser sensor in the visible region for operational measurement of subsurface ocean temperature profiles. Utilize data from field measurements with the feasibility model sensor to define performance parameters for operational systems to meet Navy measurement requirements.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Research Lab.

5.0036, INVESTIGATIONS OF TITAN'S ATMOSPHERE

W.H. Smith, Washington University, School of Arts & Sciences, Dept. of Chemistry, 4559 Scott Ave., St. Louis, Missouri 63130 *(NCA 2-841001)*

SUPPORTED BY U.S. National Aeronautics & Space Admin., Ames Research Center

5.0037, GPS TECHNIQUES FOR ARTILLERY METEOROLOGY

H.N. Ballard, U.S. Dept. of Defense, Army, Electronics Research & Development Command, Atmospheric Sciences Lab., *White Sands M.R., Las Cruces, New Mexico* 88002 (DA0F2112)

To study the technical feasibility and cost operation effectiveness of system utilization of signals emanating from NAVSTAR global positioning (GPS) to determine the successive positions versus time of balloon-borne radiosondes so as to drive meteorological data (temperature, pressure, relative humidity and wind velocity) versus altitude for artillery-met corrections and nuclear detonation debris fallout predictions in the earth surface to 30 km altitude interval.

The global positioning system is a universal positioning system providing 3-dimensional position velocity and time. Twenty-four satellites in 3 distinct orbits will give world-wide access to signals emanating from four satellites on a continuous time basis. Preliminary studies indicate that approximately two-to-three pounds of additional weight may be added to the present radiosonde balloon without altering its operational capability. A technical feasibility and cost study will be conducted by a SAMSO contractor relative to antenna, receiver, signal processor design so as to effectively receive on the radiosonde and process on the earth surface GPS signals so as to give successive positions in time of the radiosonde.

SUPPORTED BY U.S. Dept. of Defense, Electronics Research & Development Command, Atmospheric Sciences Lab.

5.0038, ATMOSPHERIC CHARACTERIZATION FOR HEL APPLICATION

G.B. Hoidale, U.S. Dept. of Defense, Army, Electronics Research & Development Command, Atmospheric Sensing Div., *White Sands M.R., Las Cruces, New Mexico* 88002 (DA0D2272)

SUPPORTED BY U.S. Dept. of Defense, Electronics Research & Development Command, Atmospheric Sciences Lab.

5.0039, NAVY ENVIRONMENT - GRAVITY MEASUREMENTS AT SEA AND LOCAL MARINE GRAVITY AND GEODETIC ANOMALIES

A.B. Watts, Columbia University, Lamont Doherty Geological Observatory, *Palisades, New York* 10964 (DN475182; N00014-75-C-0210)

The accuracy of inertial navigation systems, which are used extensively by the Navy in ships, submarines, airplanes, and missiles, is limited by the extent of knowledge about the earth's gravity field and consequent deflections-of-the-vertical. In support of the Navy's extensive effort to expand this knowledge, this program is (1) providing gravity data over the world's oceans, (2) helping to provide basic understanding of gravity variations which is necessary for predicting deflections-of-the-vertical, and (3) determining the relationship between local gravity and geodetic anomalies.

Surface and satellite-derived gravity data will be analyzed to determine the geologic structure of the crust and upper mantle in the region of plate boundaries and marginal basins. Regional maps of 1 degree-by-1 degree average gravity anomalies will be published. Detailed geoids constructed from surface gravity data and satellite data will be used to determine deflection-of-the-vertical at sea in regions of large deflections. Mathematical techniques will be developed to determine density inhomogeneities from geoid undulations.

SUPPORTED BY U.S. Dept. of Defense, Navy, Office of Naval Research

5.0040, RADIATIVE ENERGY TRANSFER IN GASES

R.D. Cess, State University of New York, Stony Brook Campus, School of Engineering & Applied Sciences, Dept. of Mechanical Engineering, *Stony Brook, New York* 11794 (CME79-09065)

This research program constitutes a continuation of an existing NSF Grant No. ENG 76-82547 A01. Part of this program concerns the coupling of atmospheric radiation models with climate models in order to estimate terrestrial climatic change due both to natural and man-made causes. Specific areas of research are: (1) ice-age modeling; (2) the study of the paleoclimate due to possible past increased atmospheric carbon dioxide; (3) annual and seasonal climate model studies of the effect upon future climate due to increased atmospheric carbon dioxde resulting from fossil fuel consumption; and (4) the role of tropospheric ozone as a climate feedback mechanism. A second area of research concerns stratospheric modeling of the atmospheres of Saturn, Uranus and Neptune. A preliminary model is extended for the interpretation of future Voyager I and II spacecraft data. Extension to the stratospheres of Uranus and Neptune is also contemplated, to attempt to explain the large stratospheric thermal emission of Neptune relative to Uranus.

SUPPORTED BY U.S. National Science Foundation, Directorate for Engineering & Applied Science, Div. of Civil & Mechanical Engineering

5.0041, SUNSPOTS

J.H. Thomas, University of Rochester, School of Engineering & Applied Science, Dept. of Aerospace & Mechanical Engineering, *260 Crittenden Blvd., Rochester, New York* 14627 (DF249000; F19628-77-C-0079)

AF function - communications, surveillance, detection, tracking. Deficiency - inadequate solar disturbance predictions. Objective -determine quantitative structure and dynamics of magnetic fields in solar sunspot regions. How research contributes - knowledge of solar magnetic field behavior is necessary to understand the role fields play in flare production.

Apply theoretical magnetohydrodynamics to observed motions and field configurations in sunspot umbrae and penumbrae. Such research will provide an insight into the physics of magnetic fields in spots and their impact on adjacent solar flare-producing plage regions.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Geophysics Lab.

5.0042, MANAGEMENT AND IN-HOUSE RESEARCH ON THE DEVELOPMENT OF AMBIENT ANALYTICAL METHODS FOR PARTICULATE POLLUTANTS

R. Stevens, U.S. Environmental Protection Agency, Office of Research & Development, Environmental Sciences Research Lab., Inorganic Pollutant Analysis Branch, *Research Triangle Park, North Carolina* 27711 (GA07 -0023)

OBJECTIVE: Develop new instruments and analytical methods for measuring visibility, aerosol mass and composition, aerosol acidity, rural haze, and procedures for relating aerosol mass to sources. Provide management and technical monitoring of extramural projects.

APPROACH: Develop telephotometer to measure visibility; polymer films for XRF calibration; radiochemical method for acidity; chemical element balance system for background aerosol.

PROGRESS: 10/79 Journal publication on aerosol acidity method. 10/79 Journal publication on chemical balance method. 12/79 Report on methods to characterize rural haze.

SUPPORTED BY U.S. Environmental Protection Agency, Office of Research & Development, Environmental Sciences Research Lab.

5.0043, MODELING OF AFRICAN DUST

R.A. Anthes, Pennsylvania State University, University Park Campus, School of Earth & Mineral Science, Dept. of Meteorology, *116 Deike Bldg., University Park, Pennsylvania* 16802 *(NCA 2-589001)*

SUPPORTED BY U.S. National Aeronautics & Space Admin., *Ames Research Center*

5.0044, AIR-DEPLOYED OCEANOGRAPHIC MOORING

E.A. Reed, U.S. Dept. of Defense, Navy, Naval Air Development Center, *Aircraft & Crew Systems Tech Directorate, Warminster, Pennsylvania* 18974 (DN781415)

To provide engineering services to naval ocean research development activity in support of the development of a moored buoy for long duration oceanographic data sampling.

Carriage aboard and deployment from P3 aircraft will be investigated. Design constraints will be determined to optimize aircraft capability and survivability of equipment evolving from feasibility state. Aerodynamic separation and loads analysis; e.g., taxi, takeoff, flight and landing load analyses will be performed. *Guidance to ONR and contractors in the areas of structural* shock and vibrational analyses will be provided. A test program will be established leading to aircraft STORE clearance and *flight certification.*

SUPPORTED BY U.S. Dept. of Defense, Office of Naval *Research, Ocean Science & Technology* Div.

5.0045, INVESTIGATION OF THE EFFECTS OF EXTERNAL CURRENT SYSTEMS ON THE MAGSAT DATA UTILIZING GRID CELL MODELING TECHNIQUES

D.M. Klumpar, University of Texas, Dallas Campus, School of Natural Science & Mathematics, Dept. of Physics, *P.O. Box 688, Richardson, Texas* 75080 (NAS 5-26309)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Goddard Space Flight Center

5.0046, THE ANALYSIS AND SYNTHESIS OF A SPECTRAL DATA TRANSFER SYSTEM THROUGH A SATELLITE CHANNEL

J.S. Lee, J.S. Lee Associates Inc., *2001 Jefferson Davis Hwy., Arlington, Virginia* 22202 (DN075239; N00014-80-C-0129)

To improve the Navy's surveillance capabilities by improving signal processing technology for satellite communication networks.

The contractor will develop a system concept for surveillance using spectral line detection via buoy fields and transmit this information via satellite to a central processing center.

SUPPORTED BY U.S. Dept. of Defense, Navy, Office of Naval Research

5.0047, DEVELOPMENT OF REMOTE SENSING TECHNIQUES FOR ALASKA WETLANDS DELINEATION

F.V. Westerlund, University of Washington, Graduate School, *Seattle, Washington* 98105 (NCA 2-850002)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Ames Research Center

5.0048, WAVE DYNAMICS AND TRANSPORT IN THE MIDDLE ATMOSPHERE - (UARS)

J.R. Holton, University of Washington, School of Arts & Sciences, Dept. of Atmospheric Science, *Seattle, Washington 98105* (NAS 5-26301)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Goddard Space Flight Center

5.0049, NIMBUS 7 LIQUID WATER AND VAPOR DATA STUDIES

K.B. Katsaros, University of Washington, School of Arts & Sciences, Dept. of Atmospheric Sciences, *Seattle, Washington* 98105 (NAS 5-26262)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Goddard Space Flight Center

5.0050, NAVY ENVIRONMENT - OCEANIC FRONTS *OF THE CENTRAL PACIFIC OCEAN*

G.I. Roden, University of Washington, School of Arts & Sciences, Dept. of Oceanography, *Seattle, Washington* 98105 (DN624375; N00014-80-C-0252)

An understanding of the variation of temperature and salinity in the transition zones between water masses of the North Pacific is important to the Navy for long-range sound propagation. These zones are frequently regions of minimum stability *and have turbulence associated with them; intensive energy ex*change between the ocean and atmosphere takes place in these regions and can generate severe weather events. This research is *to better understand large-scale mid-ocean frontogenesis and* frontolysis and to determine the variability of these fronts in the North Pacific.

*This research will examine the variability of large-scale sur*face fronts in the North Pacific by means of CTD measurements and will attempt to relate such variability to atmospheric forcing. Research efforts will be directed toward a cooperative study of the dynamics and structure of this front. A 30-day field *experiment is planned.*

SUPPORTED BY U.S. Dept. of Defense, Navy, Office of Naval Research

5.0051, STUDY CLIMATE OBSERVING SYSTEM REQUIREMENTS AND CAPABILITY ASSESSMENTS

V.E. Suomi, University of Wisconsin, Madison Campus, School of Letters & Science, Dept. of Meteorology, *500 Lincoln Dr., Madison, Wisconsin* 53706 (NAS 5-26345)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Goddard Space Flight Center

5.0052, NAVY ENVIRONMENT - SUN-EARTH EFFECTS

R. Reiter, Physikalisch Bioklimatische Forchungsstelle, *Garmisch Partenkirchen, Federal Republic of Germany* (DN875340; N00014-80-G-0065)

The objective of this research is to provide long-term experimental data by which concepts of solar terrestrial reaction mechanisms can be tested and further developed for possible application to weather prediction techniques for naval operations.

The approach is largely experimental through careful daily and longer period observations that appear to be related to solar events. These observations include neutron monitoring as a measure of the flux of galactic cosmic rays, ozone profiles and integrated ozone measurements of the atmosphere, radio-actinide measurements to detect stratospheric infusions, ion production rates in the upper atmosphere to detect change in flux of ionizing radiation or particles, and several other related measurements. These observations are made in the relatively clean air from mountain-top observatories in the German Alps.

SUPPORTED BY U.S. Dept. of Defense, Navy, Office of Naval Research

5.0053, VHF-UHF DEEP FADING

A. Bushby, Instituto Geofisico del Peru, *Huancayo, Peru* (DF584060; AFOSR-80-0040)

AF function - communications, radar. Deficiency - signal fading causes high error rates in communications, loss of signatures in radar identifications. Objective - to determine and predict effects of the equatorial ionosphere on signals transmitted by satellites. How research contributes - predicts and maximizes message reliability. This work continues VHF, UHF and GigaHertz observations in Peru. The work includes observations at Arequipa of scintillation and total electron content.

VHF and UHF satellite signals will be observed at three locations in Peru, and GigaHertz signals at one location.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Geophysics Lab.

5.0054, NAVY ENVIRONMENT - SUBMARINE PROFILING OF ARCTIC SEA ICE AND MARGINAL ICE ZONE

P. Wadhams, University of Cambridge, Scott Polar Research Inst., *Cambridge, England, United Kingdom* (DN075015; N00014-80-G-0002)

ASW/USW in the Arctic require definition of the environment in order to operate. For example, acoustic propagation transmission loss has been found to be directly related to under-ice roughness. The scientific objectives are: (1) a further analysis of Arctic Ocean ice profiles, consisting partly of the analysis of new data from a 1979 British submarine cruise and partly of the further analysis of existing data; (2) studies in the marginal ice zone, with an analysis of relevant satellite imagery; (3) some work on sea ice physical properties relevant to the above studies.

Analysis of recently acquired 1979 sovereign under-ice echograms and relationship to U.S. data; participation in the YMER-80 cruise in 1980, participation in the design and carrying out of a major multi-agency ice edge experiment, use of satellite imagery of East Greenland Current and by use of field tank and lake experiments, further quanfify wave propagation in pack ice.

SUPPORTED BY U.S. Dept. of Defense, Navy, Office of Naval Research

LIFE SCIENCES

Includes Life Sciences (general); Aerospace Medicine; Behavioral Sciences; Man/system Technology and Life Support; and Planetary Biology.

6.0001, MEASURES OF VESTIBULAR FUNCTION AND EMESIS IN ANIMAL CANDIDATES FOR FLIGHT EXPERIMENTATION

R.A. Fox, California State University & Colleges, San Jose State University, School of Social Sciences, Dept. of Psychology, *Washington Sq., San Jose, California* 95192 (NCA 2-675009)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Ames Research Center

6.0002, CALCIUM KINETICS DURING HYPOKINESIA

C.E. Cann, University of California, San Francisco Campus, Graduate School, *551 Parnassus Ave., San Francisco, California* 94122 (NCA 2-665008)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Ames Research Center

6.0003, EXPLORATORY STUDIES OF THE CARDIOVASCULAR PARAMETERS OF MOTION SICKNESS

K. Naifeh, University of California, San Francisco Campus, Langley Porter Neuropsychiatric Inst., *401 Parnassus Ave., San Francisco, California* 94122 (NCA 2-665007)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Ames Research Center

6.0004, PREDICTION OF AIRSICKNESS SUSCEPTIBILITY IN NAVY FLIGHT STUDENTS

F.E. Guedry, U.S. Dept. of Defense, Navy, Naval Aerospace Medical Research Lab., Perceptual & Behavioral Sciences Div., *Pensacola, Florida* 32508 (DN777378)

The objective is to develop procedures that will improve prediction of airsickness susceptibility. Potential benefits of this project are improvement of selection and placement methods and early detection of individuals who would benefit from therapeutic and preventive options.

Several tests involving measurement of immediate perceptual reactions to motion situations and adaptive changes in these reactions are under development. Identification of response tendencies which suggest extreme airsickness susceptibility is being accomplished by using two separate approaches. One approach has been to observe the reactions of a large group of student naval flight officers (SNFO) to potentially provocative motion sickness tests. These students are being followed through flight training. The second approach involves comparison testing of airsick referral cases who have been carefully identified as exceptionally airsick individuals with an experienced group of flight personnel selected because of their exceptional absence of airsickness.

SUPPORTED BY U.S. Dept. of Defense, Naval Medical Research & Development Command, National Naval Medical Center

6.0005, BIOCHEMICAL ASSAYS OF CULTURED KIDNEY CELLS

G.H. Barlow, University of Rochester, School of Medicine & Dentistry, Dept. of Biochemistry/Medicine, *601 Elmwood Ave., Rochester, New York* 14627 (NAS 9-16187)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Lyndon B. Johnson Space Center

6.0006, CONDUCT AIR AND GROUND CREW NOISE STUDIES TO EXPAND/UPDATE USAF BIOENVIRONMENTAL NOISE DATA HANDBOOK

R.W. Aorman, U.S. Dept. of Defense, Air Force, Aerospace Medical Research Lab., *Wright Patterson A.F.B., Dayton, Ohio* 45433 (DF321420)

USAF aircraft and equipment operations generally produce adverse noise levels at flight crew, passenger, and ground crew locations which must be evaluated with respect to hearing risk, ear protection requirements, voice communication capabilities, facility siting problems, etc. The objective of this work unit is to expand and update the USAF Bioenvironmental Noise Data Handbook (developed under work unit 72310418) and, thereby, provide the data necessary to define these physical noise environments for use by MAJCOM/airbase bioenvironmental engineers, flight/ground safety officers, and others concerned about personnel safety and effectiveness.

The technical approach is to conduct field measurements, perform spectral analyses, and then apply NOISEBANK, the most advanced Omega software, and AFR 161-35 exposure limits to compute the required physical and psychoacoustic measures.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Aerospace Medical Research Lab.

6.0007, BASIC VISUAL PERCEPTUAL PROCESSES FOR DISPLAYS

W.L. Martin, U.S. Dept. of Defense, Air Force, Aerospace Medical Research Lab., *Wright Patterson A.F.B., Dayton, Ohio* 45433 (DF322970)

To develop basic laboratory data concerning the detection and identification properties of the human visual system for simple (sinusoidal waveforms) and complex (military targets) objects under normal and abnormal operational environments (e.g., vibration and chemical warfare). To determine the threshold and suprathreshold spatio/temporal filtering properties of the human observer in the fovea and parafovea. To investigate the possibility of improving normal and abnormal vision. To evaluate advanced concepts for operator visual interfacing and quantifying information transfer.

Studies will be conducted using facilities already constructed, the Maxwellian View System (MVS), to investigate human contrast sensitivity. The MVS provides precise spectral and luminance control over sinusoidal waveforms for contrast sensitivity studies. Efforts will also include the creation of a visual psy-

chophysics laboratory (VPL). The VPL will, in addition to the MVS, incorporate a high resolution cathode ray tube (HRCRT) display system to generate simple and complex sinusoid waveforms for the measurement of large field, foveal and parafoveal contrast sensitivity and contrast matching in any orientation. The VPL will also contain a custom-made variable contrast device (VCD). The VCD will allow the control of contrast of any object on a 35mm slide to determine the contrast at detection and identification for simple and complex objects. The VPL will develop the capability to obtain visual sensory evoked potentials (VEP) to provide objective, non-invasive data about spatial information transfer characteristics in the observer. The MVS, HRCRT, VCD, and VER will also be used to develop methodologies for possible improvements to normal and abnormal vision. The data collected from these devices will be used to create digital spatial filters that will be used to filter complex objects for basic research and validation studies. The conceptual framework for this research is a multichannel model of the human visual system.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Aerospace Medical Research Lab.

6.0008, ADVANCED DISPLAY CONCEPTS
H.L. Task, U.S. Dept. of Defense, Air Force, Aerospace Medical Research Lab., *Wright Patterson A.F.B., Dayton, Ohio* 45433 (DF325530)

This work unit will examine recently evolved technology for potential application to new display approaches that take advantage of reduced weight, improved form factor, increased field-of-view or any of the myriad of such factors as can contribute to improving the interface of displayed information to the operator. The effort is partially aimed at establishing techniques that can be applied by ASD to the development of an operational helmet-mounted display (HMD) in the post-1980 time-frame. Efforts will be directed toward exploitation of advanced technology. Specific emphasis will be placed upon alternatives to panel-mounted displays for the cockpit environment.

A comprehensive technical survey will be made to include fiber optics, image conduits, various image sources and any other promising technologies that appear applicable. Laboratory work will be conducted to examine the utility of selected survey results.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Aerospace Medical Research Lab.

6.0009, INFLUENCE OF SPACE FLIGHT ON ERYTHROPOIETIN ACTIVITY AND INHIBITION
C.D. Dunn, Baylor College of Medicine, School of Medicine, *1200 Moursund Ave., Houston, Texas* 77025 (NAS 9-16180)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Lyndon B. Johnson Space Center

6.0010, JOINT DEVELOPMENT OF RECRUITING TECHNIQUES FOR MINORITY EMPLOYMENT
B.N. Jackson, Texas A & M University, Prairie View A & M University, Graduate School, *Prairie View, Texas* 77445 (NCA 2-598001)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Ames Research Center

6.0011, EVALUATION OF AIRCREW ANTI-RADIATION DRUGS
J.L. Mattsson, U.S. Dept. of Defense, Air Force, School of Aerospace Medicine, *Brooks Air Force Base, San Antonio, Texas* 78235 (DF323860)

To evaluate the combined effectiveness of promethazine, cimetidine, and thiethylperazine in alleviating the emetic episodes which often occur following exposure to gamma irradiation. Also, determine the neutron RBE for causing radioemesis.

Phase one will be to determine pharmacologically equivalent doses of the three drugs by fixing the rad dose at 350 and determining the ED 50 of each drug in mg/kg using the up-and-down technique. The second phase will be to determine the effectiveness of pairs of drugs, each at one-half equivalent dose. The third phase will be to combine all three drugs and determine their effectiveness. In a separate experiment the radioemesis neutron RBE will be determined by exposing dogs to either gamma-rich or neutron-rich radiation, determining radioemesis rad ED 50 for each N-G mix, then calculating the neutron RBE.

SUPPORTED BY U.S. Dept. of Defense, Air Force, School of Aerospace Medicine

6.0012, MECHANICAL ANTI-G PROTECTION SYSTEMS
R.M. Shaffstall, U.S. Dept. of Defense, Air Force, School of Aerospace Medicine, *Brooks Air Force Base, San Antonio, Texas* 78235 (DF322320)

Research and development of mechanical devices which aid in counteracting the physiologic effects resulting from exposure to accelerative forces (g).

Various types of mechanical devices will be developed (including fabrication) in-house and tested for their anti-g benefits using both animals and humans as experimental subjects.

SUPPORTED BY U.S. Dept. of Defense, Air Force, School of Aerospace Medicine

6.0013, VALIDATION OF PERSONALITY INVENTORY TESTS FOR IMMEDIATE RISK FUNCTION OF AIRCREW MEMBERS WITH POTENTIAL CARDIOVASCULAR DISEASE
M. Thomas, U.S. Dept. of Defense, Air Force, School of Aerospace Medicine, *Brooks Air Force Base, San Antonio, Texas* 78235 (DF321900)

This effort is part of an overall immediate risk function evaluation of aircrew members to identify those at high risk for a coronary event. The predictability of personality inventory tests will be defined and correlated with the immediate risk function probability of other risk factors. As a result of this work, a test will be defined for use in the general flyer population.

Personality inventory tests will be given to aircrew members who will be classified according to various personality types. The results will be correlated with the presence or absence of risk factors, clinical evaluations including coronary arteriography, and stress testing. This work was formerly documented under 7755-01-05.

SUPPORTED BY U.S. Dept. of Defense, Air Force, School of Aerospace Medicine

MATHEMATICAL AND COMPUTER SCIENCES

Includes Mathematical and Computer Sciences (general); Computer Operations and Hardware; Computer Programming and Software; Computer Systems; Cybernetics; Numerical Analysis; Statistics and Probability; Systems Analysis; and Theoretical Mathematics.

7.0001, DATA BASED MANAGEMENT SYSTEM ANALYSIS
J.L. Horwitz, University of Alabama in Huntsville, School of Science & Engineering, Dept. of Physics, *Huntsville, Alabama* 35807 (NAS 8-34129)

SUPPORTED BY U.S. National Aeronautics & Space Admin., George C. Marshall Space Flight Center

7.0002, TECHNOLOGY IDENTIFICATION AND APPLICATION FOR THE ADVANCED TECHNOLOGY DISPLAY HOUSE
R. Mixer, University of Southern California, School of Letters Arts & Sciences, Dept. of Mathematics, *3551 University Ave., Los Angeles, California* 90007 (NAS 2-10794)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Ames Research Center

7.0003, NUMERICAL ANALYSIS AND MACHINE COMPUTATIONS
P.J. Nikolai, U.S. Dept. of Defense, Air Force, Flight Dynamics Lab., *Wright Patterson A.F.B., Dayton, Ohio* 45433 (DF136330)

Computational algorithms are necessary for improved analysis and simulation of performance in the development of complex weapons and delivery systems, but in many cases the algorithms are unavailable, and in others they are inadequate. The goal of this work is to develop practical, effective and efficient algorithms for the solution of numerical problems arising in typical computing tasks which occur repeatedly in different settings. Research is concerned with more accurate and efficient solution of the algebraic eigenvalue problem and the solution of large systems of linear algebraic equations, both basic computations in the analysis of loading of flight vehicle structures. This work leads naturally to wide-ranging consulting activities in regard to implementing computer algorithms, to efficient use of available computing resources and to procuring additional computing resources should this prove desirable.

The computational algorithms selected for analysis and implementation are determined by requirements arising within the task and by needs communicated through consulting activities within the laboratory as a whole. A given computational requirement may be satisfied by various competing methods. Algorithms arising from these methods are analyzed and evaluated for possible implementation as subroutines for available digital computers. These studies emphasize the extension of existing theory and the development of new algorithms when a realistic survey of existing methods reveals deficiencies either in performance or documentation.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Flight Dynamics Lab.

7.0004, SUPPORTING CALCULATIONS FOR PLASMA INTERACTIONS EXPERIMENTS AT JSC
W.J. Freeman, Rice University, Wiess School of Natural Sciences, Dept. of Space Physics & Astronomy, *6100 Main, Houston, Texas* 77001 (NAS 9-16206)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Lyndon B. Johnson Space Center

7.0005, STUDY OF NUMERICAL METHODS FOR GROUND SIMULATION OF SATELLITE MOTION STABILITY
R.A. Broucke, University of Texas, Austin Campus, School of Engineering, Dept. of Aerospace Engineering & Engineering Mechanics, *200 W. 21st, Austin, Texas* 78712 (NAS 9-16221)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Lyndon B. Johnson Space Center

7.0006, COMPUTER-AIDED GEOMETRIC DESIGN
R.E. Barnhill, Utah Higher Education System, University of Utah, School of Letters & Science, Dept. of Mathematics, *1400 E. 2nd S., Salt Lake City, Utah* 84112 (MCS78-01966)

Computer-Aided Geometric Design (CAGD) is the effective computer representation of curves and surfaces. CAGD enables one to quantify mathematically and then to design interactively free-form curves and sculptured surfaces. Applications include the design of surfaces of airplanes, automobiles, ships, and the finite element analysis of these surfaces. Additional applications include the display of the surface of the human heart and of the earth. Computer graphics are integral to this research. The underlying mathematics for surfaces are variations of Coons patches for rectangles and triangles and of Shepard's Formula for arbitrarily spaced data. For curves, B-splines are used. Geometric handles for surface manipulation from a data tablet have been devised. This graphical software is necessary for real-time surface recomputation. This research is a combination of mathematical and computer software, requiring research contributions from Mathematics and Computer Science.

This is a continuation of grant MCS-7413017 A01.

SUPPORTED BY U.S. National Science Foundation, Directorate for Mathematical & Physical Sciences, Div. of Mathematical & Computer Sciences

7.0007, SOFTWARE SYSTEMS FOR PROCESSING ADVANCED SATELLITE DATA
L.P. Murphy, U.S. Dept. of Defense, Army, Corps of Engineers, Engineer Topographic Lab., *Fort Belvoir, Virginia* 22060 (31580)

OBJECTIVES: Analyze, model, develop techniques, software, and perform feasibility testing of algorithms for extracting useful terrain data from advanced (LANDSAT-D) satellite systems for selected CoE applications; obtain hardware/software tradeoffs and costs for computer processing of the advanced high resolution (30 m/pixel) Thematic, Mapper, LANDSAT-D, digital data.

APPROACH: Under contract in FY 79, a study was initiated to develop a preliminary assessment of systems costs, hardware/software tradeoffs for processing LANDSAT-D Thematic Mapper (TM) data (8 times that of current systems) for selected Corps remote sensing applications. In FY 80, a contract will be awarded to analyze and simulate the TM using digital RBV data; later in FY 80, the contract will be modified to digitally combine multi-spectral and SEASAT radar data. In FY 81, all efforts under this work unit will be consolidated and updated to result in a detailed assessment of costs, hardware/systems tradeoffs for the implementation of LANDSAT-D data processing within the Corps; this assessment will include a go or no-go recommednation to Corps Headquarters for acquisition or lease of a central data processing facility and/or the use of commercially available systems or services.

SUPPORTED BY U.S. Dept. of Defense, Corps of Engineers, Engineer Topographic Lab.

PHYSICS

Includes Physics (general); Acoustics; Atomic and Molecular Physics; Nuclear and High-energy Physics; Optics; Plasma Physics; Solid-state Physics; Thermodynamics and Statistical Physics. For Related Information See Also Engineering.

8.0001, PLASMA AND MAGNETOSPHERIC RESEARCH
R.H. Comfort, University of Alabama in Huntsville, School of Science & Engineering, Dept. of Physics, *Huntsville, Alabama* 35807 (NAS 8-33982)

SUPPORTED BY U.S. National Aeronautics & Space Admin., George C. Marshall Space Flight Center

8.0002, SHORT-RANGE ORDERING STUDIES USING SCANNING TRANSMISSION ELECTRON MICROSCOPY
J.M. Cowley, Arizona State University, School of Liberal Arts, Dept. of Physics, *Tempe, Arizona* 85281 (DMR79-26460)

The addition of an optical analyzer to a scanning transmission electron microscope (STEM) has allowed a great improvement in the technique for obtaining diffraction patterns from very small specimen regions. It has also provided new STEM imaging modes and has revealed a new type of interference phenomenon in the shadow images of thin crystals. These shadow image fringe patterns serve in practice as effective guides for the proper instrumentatal adjustments for taking microdiffraction patterns and STEM imgages. These techniques employing the optical analyzer system will be used in the continuation of the investigations of the structures of thin amorphous films and of disordered arrangements of atoms in crystalline solids. A new theoretical approach to the interpretation of microdiffraction patterns has been evolved as a means for interpreting patterns obtained from amorphous silicon and other systems. The high resolution STEM imaging of atom configurations in cyrstals, already demonstrated, will be coupled with microdiffraction and microanalysis studies to elucidate problems of ordering in nonstoichiometric oxides and sulfides.

This is the first year of a three-year continuing grant, and is a renewal of research started under NSF Grant DMR77-21843.

SUPPORTED BY U.S. National Science Foundation, Directorate for Mathematical & Physical Sciences, Div. of Materials Research

8.0003, FEASIBILITY STUDY OF A NEW TYPE OF CASCADE SOLAR CELL
E.Y. Wang, Arizona State University, School of Liberal Arts, Dept. of Physics, *Tempe, Arizona* 85281 (NAG 3-105)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Lewis Research Center

8.0004, COSMOLOGICAL AND LOCAL EFFECTS OF THE VARIABLE COSMOLOGICAL CONSTANT
V. Petrosian, Stanford University, School of Humanities & Sciences, Dept. of Applied Physics, *Stanford, California* 94305 (NCA 2-745008)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Ames Research Center

8.0005, DEFECT INTERACTIONS IN CRYSTALS
A.V. Granato, University of Illinois, Urbana Champaign Campus, School of Liberal Arts & Sciences, Dept. of Physics, *Urbana, Illinois* 61801 (DMR80-15707)

A recently proposed generalized rate theory predicts the existence of several different regimes of diffusion. These regimes depend upon the viscosity of the medium, the frequencies of the defects, and the external force. These parameters can be measured and controlled for diffusing dislocations. We have already explored the boundary between the regime where conventional tradition-state rate theory applies and the low viscosity region where inertial effects due to multiple jumps occur. Ultrasonic experiments will be carried out to demonstrate the existence and properties of the boundary between the conventional and the high viscosity regime.

This research was previously supported under NSF Grant No. DMR-7710556.

This is the first year of a three-year continuing grant.

SUPPORTED BY U.S. National Science Foundation, Directorate for Mathematical & Physical Sciences, Div. of Materials Research

8.0006, OPTICAL PROPERTIES OF SOLIDS
L.L. Chase, Indiana University, Bloomington Campus, School of Arts & Sciences, Dept. of Physics, *Memorial Hall, Bloomington, Indiana* 47401 (DMR78-09426)

Experimental investigations of light scattering and laser spectroscopy of solids previously supported by NSF grant DMR-7609091 will continue. The studies will concentrate on two problem areas: (1) Impurity-induced Raman scattering measurements of coupled electronic and vibrational excitations for impurities with degenerate, or nearly degenerate, ground states. (2) Two-photon absorption and induced absorption studies of excitons and exciton interactions in wide band-gap semiconductors. In addition, light scattering studies of impurity-induced ferroelectric phase transitions in KTaO3, primarily at low impurity concentrations, will be initiated. These studies of optical scattering in solids using laser radiation are directed toward providing an improved understanding of electronic and vibrational dynamical effects in insulators and wide band-gap semiconductors.

This is the first year of a three-year continuing grant.

SUPPORTED BY U.S. National Science Foundation, Directorate for Mathematical & Physical Sciences, Div. of Materials Research

8.0007, HYPERFINE FIELD STUDIES OF SMALL METAL PARTICLES BY PERTURBED ANGULAR CORRELATIONS
R.C. Reno, University of Maryland, Baltimore County Campus, Graduate School, Dept. of Physics, *Catonsville, Maryland* 21228 (11920-B5,6)

Magnetic hyperfine fields in small nickel particles have been measured by observing a perturbation in the angular correlation of gamma rays emitted from impurities deliberately introduced into the host metal. Nickel particles with diameters smaller than 10 nm are superparamagnetic at room temperature and therefore do not produce static hyperfine fields at the impurities. As one cools down, the particles become ferromagnetic and one sees a change in the angular correlation which is due to the appearance of static hyperfine fields. Two impurity nuclei have been used in this project to detect hyperfine fields - 111Cd and 99Ru. Both give perturbed angular correlation (PAC) spectra that clearly show the transition from superparamagnetism to ferromagnetism as one cools down. We are now using 99Ru PAC to study the effect of nickel particle size on the transition temperature.

SUPPORTED BY American Chemical Society

8.0008, STUDIES OF ELECTRON TRANSPORT AND MAGNETIC INTERACTIONS IN METALS
J. Bass, Michigan State University, School of Arts & Letters, Dept. of Physics, *Soil Science Bldg., East Lansing, Michigan* 48824 (DMR80-05865)

This is a continuation of research previously supported by NSF grant DMR 77-04680.

Transport and magnetic experimental studies will be carried out for two broad categories of materials, dilute magnetic alloys and non-magnetic alloys. The current work has identified several alloy systems of particular importance for understanding the behavior of dilute magnetic alloys. A set of measurements will be done which are designed to probe the basic causes of magnetic behavior in these alloys. These measurements will be extended to alloys based upon palladium hydride. Using an existent ultra-low temperature facility and recently developed ability to measure resistivity to better than 1 ppm, studies will be made of potassium and potassium alloys designed to search for electron-electron (and/or phason) effects; of Al, K and Pd designed to identify the many-body enhancements present in thermoelectricity; and, of transport anomalies in tungsten alloys.

This is the first year of a three-year continuing grant.

SUPPORTED BY U.S. National Science Foundation, Directorate for Mathematical & Physical Sciences, Div. of Materials Research

8.0009, NEUTRON SCATTERING STUDIES OF THE TRANSITION METAL SESQUIOXIDES
S.A. Werner, University of Missouri, Columbia Campus, Graduate School, *205 Jesse Hall, Columbia, Missouri* 65201 (DMR77-27247)

Neutron scattering experiments will be carried out at the University of Missouri Research Reactor to investigate the highly unusual magnetic and electronic properties of the vanadium and titanium oxides. Large single crystals suitable for neutron scattering experiments have been obtained and will be used in the following experiments: 1) Measurement of the phonon dispersion in V2O3 above and below the semiconductor-to-metal transition (170 degrees K). 2) Measurement of the magnon dispersion in V2O3 below the Neel temperature. 3) Measurement of the phonon dispersion in Ti2O3 as a function of temperature. 4) Measurements on chromium-doped V2O3 at temperatures where the speculated Mott transition occurs. 5) Measurements of the magnetic ordering in titanium-doped V2O3 as a function of temperature.

This is the first year of a two-year continuing grant.

SUPPORTED BY U.S. National Science Foundation, Directorate for Mathematical & Physical Sciences, Div. of Materials Research

8.0010, MULTI-USE GAMMA RAY DIFFRACTOMETER FOR RESEARCH ON SOLIDS
W.B. Yelon, University of Missouri, Columbia Campus, Research Reactor Facility, *130 Jesse Hall, Columbia, Missouri* 65201 (DMR79-12508)

A gamma-ray diffractometer has been built for accurate studies of the diffraction from single cystals at short wavelengths, using sources of 198AU (0.03 Angstroms) and 153SM (0.12 Angstroms). Several experiments will be carried out, in collaboration with outside users, to test the capabilities and limitations of the technique as well as to address a number of problems concerned with the physics and chemistry of bonding.

This is the first year of a two-year continuing grant.

This research was previously supported by NSF grant DMR-7617349.

SUPPORTED BY U.S. National Science Foundation, Directorate for Mathematical & Physical Sciences, Div. of Materials Research

8.0011, STUDY OF A TOPOLOGICAL APPROACH TO PARTICLE THEORY
C.E. Jones, University of Nebraska, Lincoln Campus, School of Arts & Sciences, Dept. of Physics, *Lincoln, Nebraska* 68508 (PHY80-07643)

This work is in the area of theoretical physics and involves the study of an approach to understanding elementary particles and their interactions based on the topology of two-dimensional surfaces. Such a general approach has already proved to be of value not only in gauge theories (Quantum Chromodynamics or QCD) but also in the S-matrix theory approach based on self-consistent unitarity. A major goal of this research is to elucidate the underlying quark structure of nature through self-consistent or bootstrap equations. Recent developments in the field of Dual Topological Unitarization (DTU) have made possible the inclusion of both mesons and baryons in the bootstrap theory. The resulting dynamics and their implications for the description of high energy behavior of scattering cross-sections in terms of Regge poles will be investigated. Previous calculations for Regge pole parameters will be refined and improved and the possibility of applying these general topological techniques to weak interactions will be studied. An effort will be made to explore the concepts of 'color' and 'gluon' in DTU in order to relate them to the corresponding concepts in QCD. This work was previously supported under NSF grant PHY78-09619.

SUPPORTED BY U.S. National Science Foundation, Directorate for Mathematical & Physical Sciences, Div. of Physics

8.0012, INVESTIGATE THE INFLUENCE OF AURORAL ENERGETIC AND ELECTRODYNAMIC COUPLING ON MIDDLE ATMOSPHERE PARAMETERS
J.D. Mitchell, Pennsylvania State University, University Park Campus, Graduate School, *205 Kern Graduate Bldg., University Park, Pennsylvania* 16802 (NAG 6-7)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Wallops Flight Center

8.0013, NUCLEAR MAGNETIC RESONANCE STUDIES OF THE STRUCTURE OF GLASSES
P.J. Bray, Brown University, Graduate School, Dept. of Physics, *University Hall, Box 1883, Providence, Rhode Island* 02912 (DMR80-04488)

Major extensions of recent developments in nuclear magnetic resonance (NMR) studies of glass structure and bonding will be carried out. In particular several borate glasses and silicate glasses will be investigated. Further, bridging and non-bridging oxygens will be studied in various oxide glasses. Also, studies of the ionic motion in several lithim glasses will be made. Finally, the effect of transition metal ions - as major components - on the structure of borate glasses will be studied.

Research previously supported by DMR 77-08600.

This is the first year of a three-year continuing grant.

SUPPORTED BY U.S. National Science Foundation, Directorate for Mathematical & Physical Sciences, Div. of Materials Research

8.0014, THEORECTICAL AND EXPERIMENTAL STUDY OF BEAN PLASMA PHYSICS
H.R. Anderson, Rice University, Wiess School of Natural Sciences, Dept. of Space Physics & Astronomy, *6100 Main, Houston, Texas* 77001 (NAS 8-33771)

SUPPORTED BY U.S. National Aeronautics & Space Admin., George C. Marshall Space Flight Center

8.0015, MUON PRECESSION IN SOLIDS
W.J. Kossler, College of William & Mary, Williamsburg College, School of Arts & Sciences, Dept. of Physics, *Ewell Hall, Williamsburg, Virginia* 23185 (DMR80-07059)

Research with the MSR (Muon Spin Rotation) technique will be continued. Related theoretical studies on the behavior in solids of this light isotope of hydrogen will also be carried out.

Muon localization, trapping and diffusion in metals will be studied. Impurity type and concentration will be systematically varied. Use of longitudinal and zero field techniques will be made.

For magnetic materials, the internal magnetic field at the muon will be measured. The dependence of the internal field on applied field (Knight shift), applied uniaxial stress (changes arising mostly from the movement of atomic dipoles), and alloying (changes in the electronic structure) will be determined. Spin glasses and critical phenomena will also be studied.

Fast detectors will be used to investigate muonium formation in silicon and germanium. Experiments will be performed at the LAMPF (Los Alamos), TRIUMF (British Columbia) and SIN (Switzerland) accelerators.

This research was previously supported under NSF Grant No. DMR 7712602.

This is the first year of a three-year continuing grant.

SUPPORTED BY U.S. National Science Foundation, Directorate for Mathematical & Physical Sciences, Div. of Materials Research

SOCIAL SCIENCES

Includes Social Sciences (general); Administration and Management; Documentation and Information Science; Economics and Cost Analysis; Law and Political Science; and Urban Technology and Transportation.

9.0001, CONDUCT A CONFERENCE ENTITLED 'THE SPACE AGE: HOW DO YOU LIKE IT SO FAR?'
E. Theodore, Yale University, School of Arts & Sciences, Dept. of History, *206 Elm, New Haven, Connecticut* 06520 (NASW 3430)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of External Relations

SPACE SCIENCES

Includes Space Sciences (general); Astronomy; Astrophysics; Lunar and Planetary Exploration; Solar Physics; and Space Radiation. For Related Information See Also Geosciences.

10.0001, SURVEY OF BRIGHT (PG) QUASARS
R.F. Green, University of Arizona, School of Liberal Arts, Dept. of Astronomy, *Tucson, Arizona* 85721 (NAG 8-380)

SUPPORTED BY U.S. National Aeronautics & Space Admin., George C. Marshall Space Flight Center

10.0002, A HIGH ANGULAR RESOLUTION FAR INFRARED STUDY OF STAR FORMATION IN THE M17 REGION
P.M. Harvey, University of Arizona, School of Liberal Arts, Dept. of Astronomy, *Tucson, Arizona* 85721 (NCA 2-40001)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Ames Research Center

10.0003, THE X-RAY PROPERTIES OF CLOSE PAIRS OF GALAXIES (ABBREV)
J.T. Stocke, University of Arizona, School of Liberal Arts, Dept. of Astronomy, *Tucson, Arizona* 85721 (NAG 8-370)

The X-ray properties of close pairs of galaxies and low spectral resolution optical survey of the HEAO-B high resolution imager and imaging proportional counter fields.

SUPPORTED BY U.S. National Aeronautics & Space Admin., George C. Marshall Space Flight Center

10.0004, A HOT NEARBY WHITE DWARF, IDENTIFYING THE BRIGHT SOFT X-RAY SOURCES FOUND BY HEAO-1 (ABBREV)
G. Garmire, California Inst. of Technology, Graduate School, Dept. of Physics Mathematics & Astronomy, *1201 E. California Blvd., Pasadena, California* 91109 (NAG 8-374)

A hot nearby white dwarf, indentifying the bright soft x-ray sources found by HEAO-1, HRI observe of the point source in RCW 103, find brightest soft e-xray cataclysmic variables in quiescence.

SUPPORTED BY U.S. National Aeronautics & Space Admin., George C. Marshall Space Flight Center

10.0005, IPC OBSERVATIONS OF INTERSTELLAR BULLETS AND IPC OBSERVATIONS OF A NEW TYPE OF EXTRAGALACTIC OBJECT FOUND AT INFRARED WAVELENGTHS
S.H. Pravdo, California Inst. of Technology, Graduate School, Dept. of Physics Mathematics & Astronomy, *1201 E. California Blvd., Pasadena, California* 91109 (NAG 8-376)

SUPPORTED BY U.S. National Aeronautics & Space Admin., George C. Marshall Space Flight Center

10.0006, THREE-DIMENSIONAL SOLAR WIND MODELING
S.F. Nerney, California State University & Colleges, San Francisco State University, School of Science, Dept. of Physics & Astronomy, *1600 Holloway Ave., San Francisco, California* 94132 (NCC 2-95)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Ames Research Center

10.0007, AN X-RAY STUDY OF PRE-MAIN SEQUENCE STARS IN NGC 2264 WITH THE HRI
L.N. Kuhi, University of California, Berkeley Campus, School of Letters & Science, Dept. of Astronomy, *Berkeley, California* 94720 (NAG 8-381)

SUPPORTED BY U.S. National Aeronautics & Space Admin., George C. Marshall Space Flight Center

10.0008, EXTERNAL GALAXIES AND QUASI-STELLAR OBJECTS
E.M. Burbidge, University of California, San Diego Campus, Graduate School, Dept. of Physics, *P.O. Box 109, La Jolla, California* 92037 (AST79-22032)

A combined observational and theoretical program of research on problems of the physics of quasars and related extragalactic objects, using the 3-m and 4-m telescopes at Lick, Kitt Peak, and Cerro Tololo Observatories will be carried out. Quasars are generators of very large amounts of energy, by processes still little understood. Their relationship to the active centers of galaxies - radio galaxies, Seyferts, etc. - and their role in the evolutionary history of galaxies and the universe are parts of the puzzle which they present. The problem of the source of their large outpourings of energy from very small volumes, and their possible connection with states of matter (gravitationally collapsed matter, black holes, etc.) unattainable on earth, make these objects interesting to physicists as well as astronomers, and also of general popular interest. Particular attention will be devoted to quasars with very large red-shifts which may be the most distant visible objects in the universe.

Identification work and red-shift measurements for very faint radio galaxies will also be carreid out, to help map the expansion of the universe and its evolutionary history.

The research is timely now, with the prospect of new research in these fields being opened up by the Space Telescope and other Shuttle-related space experiments.

This is a continuation of research previously supported by grant AST-7722560.

SUPPORTED BY U.S. National Science Foundation, Directorate for Astronomical Atmospheric Earth & Ocean Scis., Div. of Astronomical Sciences

10.0009, A STUDY OF EXTRAGALACTIC SOURCES
D.M. Worrall, University of California, San Diego Campus, Graduate School, Dept. of Physics, *P.O. Box 109, La Jolla, California* 92037 (NAG 5-63)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Goddard Space Flight Center

10.0010, IPC OBSERVATIONS OF 31 SELECTED QUASARS FOR DETERMINATION OF THEIR AVERAGE 0.15 - 5000 KEV SPECTRUM 1
D.M. Worrall, University of California, San Diego Campus, Graduate School, Dept. of Physics, *P.O. Box 109, La Jolla, California* 92037 (NAG 8-377)

SUPPORTED BY U.S. National Aeronautics & Space Admin., George C. Marshall Space Flight Center

10.0011, STUDIES OF IONIZED GAS IN GALAXIES, QUASARS, AND NEBULAE
D.E. Osterbrock, University of California, Santa Cruz Campus, Lick Observatory, *Mount Hamilton, California* 95140 (AST79-19227)

The purpose of the research being continued in this program is to gain additional information on the gas and dust in various types of galaxies and quasars. The gas component to be concentrated on is the ionized component. The types of galaxies to receive special emphasis are known and suspected Seyfert and N galaxies. The spectrophotometric measurements are to be carried out with the image tube-image dissector scanner on the Shane 120-inch telescope at Lick Observatory on Mt. Hamilton in California. Observations will be combined with the theoretical models to learn the temperatures, densities, states of ionization, excitation, and dissociation, composition, velocity fields, and spatial distribution of the gas in the galaxies to be studied. Comparisons will be made with several types of gaseous nebulae in our own galaxy, such as H II regions, planetary nebulae, and supernova remnants. These comparisons are important for understanding the properties of the ionized gas in the quasars and active galaxies to be studied.

This research continues work being done under AST-7618440.

SUPPORTED BY U.S. National Science Foundation, Directorate for Astronomical Atmospheric Earth & Ocean Scis., Div. of Astronomical Sciences

10.0012, CHARACTERISTICS OF GIANT STARS IN THE NUCLEAR BULGE OF THE GALAXY
A.E. Whitford, University of California, Santa Cruz Campus, Lick Observatory, *Mount Hamilton, California* 95140 (AST80-04467)

The observations to be carried out are the next step in a program to study the stellar population of the nuclear bulge of our galaxy as the nearest example of an old galaxy population. The stars are close enough to permit a census of resolved stars whose individual properties may be separately determined. In the first step, a study of the spectral characteristics of the integrated light of patches of the bulge has shown it to be a typical sample of a normal galaxy. The second step was photometry of several hundred bulge stars to produce a new diagram showing brightness versus temperature (as indicated by color). The giant branch is found to depart markedly from that expected if the standard giant branch determined from stars near the sun were moved to the bulge. Bulge giants at the cool end are too faint in infrared light, and there is an unexpected depression in the red part of the energy curve.

Modern high-efficiency detectors on telescopes in Chile will be used to obtain more detailed spectral information. This should indicate how the different age, mass, and metal content of the bulge giants have affected their evolution. Once their physical properties are determined, there should be data for constructing a population model applicable to a large class of galaxies. The procedure is more direct than attempts to match the integrated characteristics of unresolved galaxies by synthe-

sizing a mix of the types of stars found in the solar neighborhood.

SUPPORTED BY U.S. National Science Foundation,
Directorate for Astronomical
Atmospheric Earth & Ocean Scis., Div.
of Astronomical Sciences

10.0013, A CRITICAL TEST OF THE ROTATION-CORONAE CORRELATION WITH SELECTED HERTZSPRUNG GAP STARS
T.S. Simon, University of Colorado, Boulder Campus, School of Arts & Sciences, Dept. of Astro Geophysics, *1200 University Ave., Boulder, Colorado* 80302 (NAG 8-382)

SUPPORTED BY U.S. National Aeronautics & Space Admin.,
George C. Marshall Space Flight Center

10.0014, X-RAY OBSERVATIONS OF RUNAWAY STARS
C.K. Kumar, Howard University, Graduate School of Arts & Sciences, Dept. of Physics & Astronomy, *2400 6th St. N.W., Washington, District of Columbia* 20001 (NAG 8-371)

SUPPORTED BY U.S. National Aeronautics & Space Admin.,
George C. Marshall Space Flight Center

10.0015, FAR INFRARED ASTRONOMY
D.P. McNutt, U.S. Dept. of Defense, Navy, Naval Research Lab., *4555 Overlook Ave. S.W., Washington, District of Columbia* 20375 (DN920018)

Measure infrared background radiation from stellar, solar, and terrestrial sources to provide data for optimizing military infrared surveillance and intercept equipment. Develop cryogenically cooled sensors, detectors, and amplifiers for background-limited source detection against high- and low-background surroundings.

Infrared sky survey at 8-120 microns from rocket-borne photometry. Develop very high resolution techniques for detecting line radiation sources against a continuum background. Observe IR-submillimeter (2 microns-4mm) astronomical sources from ground-based, aircraft and balloon observatories.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval
Research Lab.

10.0016, RESEARCH IN GALACTIC AND EXTRAGALACTIC X-RAY ASTRONOMY
M.P. Ulmer, Northwestern University, Evanston Campus, School of Arts & Sciences, Dept. of Physics & Astronomy, *633 Clark St., Evanston, Illinois* 60201 (NAG 8-367)

SUPPORTED BY U.S. National Aeronautics & Space Admin.,
George C. Marshall Space Flight Center

10.0017, HIGH ENERGY ASTRONOMICAL OBSERVATORY-A1 OBSERVATIONS OF AM HERCULIS AND RELATED OBJECTS
R.H. Durisen, Indiana University, Bloomington Campus, School of Arts & Sciences, Dept. of Astronomy, *Memorial Hall, Bloomington, Indiana* 47401 (NAG 8-362)

SUPPORTED BY U.S. National Aeronautics & Space Admin.,
George C. Marshall Space Flight Center

10.0018, ULTRAVIOLET SPECTROSCOPY OF SELECTED ASTRONOMICAL SOURCES
J.S. Drilling, Louisiana State University, Agricultural & Mechanical College, School of Science, Dept. of Physics & Astronomy, *University Station, Baton Rouge, Louisiana* 70803 (NAG 5-71)

SUPPORTED BY U.S. National Aeronautics & Space Admin.,
Goddard Space Flight Center

10.0019, IONOSPHERIC DENSITY MEASUREMENT BY X-RAY SOURCE OCCULATION
D.L. Matthews, University of Maryland, College Park Campus, Inst. for Physical Science & Technology, *College Park, Maryland* 20742 (NAG 8-379)

SUPPORTED BY U.S. National Aeronautics & Space Admin.,
George C. Marshall Space Flight Center

10.0020, OBSERVATION OF ULTRAVIOLET EMISSION FROM GLOBULAR CLUSTERS
T. Matilsky, Rutgers the State University of New Jersey, New Brunswick Campus, School of Arts & Sciences, Dept. of Astronomy, *Old Queens Bldg., New Brunswick, New Jersey* 08903 (NAG 5-70)

SUPPORTED BY U.S. National Aeronautics & Space Admin.,
Goddard Space Flight Center

10.0021, SOLAR FLARE ACTIVITY
F.H. Reder, U.S. Dept. of Defense, Army, Communications Research & Development Command, Center for Communications Systems, *Fort Monmouth, Red Bank, New Jersey* 07703 (DA0G2713)

Compare results of last year's solar activity analysis for entire previous solar cycle with results of analysis of activity during first half of current solar cycle. While the current cycle is, as predicted, much stronger with respect to sunspot numbers and steady radiation output, it has up-to-now been weak with respect to abrupt flare activity. This raises the following question to be studied: has total (steady plus abrupt) radiation output only an eleven-year cycle which is composed of two out-of-phase 22-year cycles, one for steady radiation and the other for eruptive radiation? Study possibility that X-ray flare behavior has features indicative of following proton emission causing polar communication blackout. Study statistical behavior of X-ray flares for possibilities to predict near-future flare activity from recent activity.

Utilize published X-ray and proton flare fluxes, as well as locally available VLF phase anomalies caused by flares as basis for statistical studies. Compare sunspot numbers with monthly sums of X-fluxes for both solar cycles.

SUPPORTED BY U.S. Dept. of Defense, Communications
Research & Development Command,
Center for Communications Systems

10.0022, EXPLOSIVE HIGH ENERGY ASTROPHYSICS - PHENOMENA IN SUPERNOVAE AND QUASARS
S.A. Colgate, New Mexico Inst. of Mining & Technology, Graduate School, Dept. of Physics, *Campus Station, Socorro, New Mexico* 87801 (AST80-07468)

The research to be carried out under this grant will be in two general areas: supernovae and quasars. The supernova phenomena of special interest are: (1) the energy spectrum of ejected matter and radiation, and (2) the mechanism(s) of explosion. Specifically, the research will explore the relationships between the optical, X-ray, gamma ray luminosities, and pre-supernova structure and ejected matter for Type I supernovae. This knowledge will be applied to the question of ultra high energy particle acceleration.

The quasar research will have as its objectives: (1) to continue a thorough analysis of the radio spectrum; (2) to analyze polarization properties of the radiation; (3) to calculate the expected gamma ray spectrum; and (4) to investigate the effects of relativistic dispersion relations on the model.

SUPPORTED BY U.S. National Science Foundation,
Directorate for Astronomical
Atmospheric Earth & Ocean Scis., Div.
of Astronomical Sciences

10.0023, BACKGROUND SKY BRIGHTNESS MEASUREMENTS FOR APPLICATION TO SPACE SURVEILLANCE SYSTEMS
J.L. Weinberg, State University of New York, Albany Campus, School of Arts & Sciences, Dept. of Astronomy & Space Sci-

ences, *1400 Washington Ave., Albany, New York* 12222 (DF044830; F49620-78-C-0013)

AF function - space object detection, identification and surveillance require detailed knowledge of the background sky brightness. Accurate measurements must be made of the position and irradiance of celestial sources at all wavelengths. Deficiency - there has been no way to test two long-standing assumptions: (1) the description of the number density of scattering centers by a power law, and (2) the independence of heliocentric distance of the light scattering characteristics of zodiacal light. Objective - to derive a detailed model of the interplanetary dust cloud, which includes both the spatial distribution and physical characteristics of the dust grains. Contribution - only a probe such as Pioneer 10/11 can determine the change of brightness with heliocentric distance. Analysis of the data will permit for the first time the inversion of the brightness integral of zodiacal light by differentiation.

The data consist of ground-based (Mt. Haleakala, Hawaii), earth-orbital (SKYLAB) and deep-space probe (Pioneer 10/11) observations of brightness, polarization and color over the entire sky. The separation of the zodiacal light from the background starlight is made possible by the Pioneer 10/11 observations, which show the zodiacal light to be negligible beyond the asteroid belt. The Pioneer zodiacal light data also provide the brightness as a function of sun angle and heliocentric distance. SKYLAB and ground-based data provide complementary information and allow the light scattering properties of the dust to be determined as a function of position on the sky and heliocentric distance.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

10.0024, OBSERVATIONS OF THE RAPID VARIABLE AE AQR IN THE HIGH ENERGY ASTRONOMICAL OBSERVATORY-B GUEST INVESTIGATOR PROGRAM
G.L. Chincarini, University of Oklahoma, Norman Campus, School of Arts & Sciences, Dept. of Physics & Astronomy, *660 Parrington Oval, Room 101, Norman, Oklahoma* 73069 (NAG 8-372)

SUPPORTED BY U.S. National Aeronautics & Space Admin., George C. Marshall Space Flight Center

10.0025, A STUDY OF ATMOSPHERE-IONOSPHERE-MAGNETOSPHERE COUPLING
W.J. Raitt, Utah Higher Education System, Utah State University, School of Science, Dept. of Physics, *Main Bldg., Office 104, Logan, Utah* 84321 (NAG 5-121)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Goddard Space Flight Center

10.0026, DATA ANALYSIS OF SOFT X-RAY OBSERVATIONS WITH HIGH ENERGY ASTRONOMICAL OBSERVATIONS-2 OF LATE TYPE STARS
M. Kafatos, George Mason University, School of Arts & Sciences, Dept. of Astronomy, *400 University Dr., Fairfax, Virginia* 22030 (NAG 5-124)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Goddard Space Flight Center

10.0027, STAR FORMATION IN BLUE COMPACT DWARF GALAXIES
T.X. Thuan, University of Virginia, School of Arts & Sciences, Dept. of Astronomy, *Garrett Hall, Charlottesville, Virginia* 22903 (NAG 5-61)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Goddard Space Flight Center

10.0028, OBSERVATION TIME IN GUEST INVESTIGATOR PROGRAM (ABBREV)
T.X. Thuan, University of Virginia, School of Arts & Sciences, Dept. of Astronomy, *Garrett Hall, Charlottesville, Virginia* 22903 (NAG 8-375)

Observation time in guest investigator program for X-ray observations of 2 remarkable groups of quasars & X-ray observations of selected area 57 & X-ray observations of blue compact dwarf galaxies.

SUPPORTED BY U.S. National Aeronautics & Space Admin., George C. Marshall Space Flight Center

10.0029, X-RAY AND IUE STUDY OF BALL AND CH STARS
E. Bohm Vitense, University of Washington, School of Arts & Sciences, Dept. of Astronomy, *Seattle, Washington* 98105 (NAG 8-378)

SUPPORTED BY U.S. National Aeronautics & Space Admin., George C. Marshall Space Flight Center

10.0030, ANALYSIS AND INTERPRETATION OF X-RAY TIMING OBSERVATIONS HEAO-1 GUEST INVESTIGATOR PROGRAM
P.E. Boynton, University of Washington, School of Arts & Sciences, Dept. of Astronomy, *Seattle, Washington* 98105 (NAG 8-366)

SUPPORTED BY U.S. National Aeronautics & Space Admin., George C. Marshall Space Flight Center

GENERAL

11.0001, NASA-ARC & THE HASTINGS COLLEGE OF LAW TO ENCOURAGE & SUPPORT BASIC, EXPLORATORY & APPLIED LEGAL RESEARCH OF MUTUAL BENEFIT TO THE PARTIES
D.F. Henke, University of California, Hastings College of Law, School of Law, *198 McAllister St., San Francisco, California* 94102 (NCA 2-280001)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Ames Research Center

11.0002, SIMULATOR FIDELITY AND NUMEROSITY EFFECTS IN CDTI EXPERIMENTATION
J.G. Kreifeldt, Tufts University, Medford Campus, School of Engineering, Dept. of Engineering Design, *Medford, Massachusetts* 02155 (NCC 2-93)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Ames Research Center

11.0003, REMOTE SENSING DATA ANALYSIS SUPPORT
B.J. Turner, Pennsylvania State University, University Park Campus, School of Forest Resources, Dept. of Forest Science, *102 Ferguson Bldg., University Park, Pennsylvania* 16802 (NAS 5-26323)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Goddard Space Flight Center

NASA
National Aeronautics and
Space Administration

Available Now

NASA'S award winning motion picture

ACCESS

Produced by NASA's Scientific and Technical Information Office, this 23-minute, 16 mm color film follows information flow from generation through documentation, handling, and packaging into the variety of information services and products available to serve the scientific and engineering community. The rapid announcement mechanisms, the micropublication program, and the online, interactive RECON system are featured.

The 1975 International Film and TV Festival of New York recognized the excellence of the film with its Silver Award for Technical Documentaries. More recently the film was cited by the American Society for Information Science as the Outstanding Information Science Movie of 1976.

Whether you are interested in keeping up with ongoing research and development, retrospective searching, or scientific and technological updating, the film provides a better understanding and appreciation of NASA's information services. Show it soon and provide your users with a better understanding of how to use available information services and products more effectively.

To obtain a loan copy of ACCESS

Write
General Manager
NASA Scientific and Technical Information Facility
P.O. Box 8757
BWI Airport, Md. 21240
or call
(301) 796-5300

ACCESS (Identification Number HQ 241) is available on loan from the NASA Regional Film Libraries located at NASA Centers throughout the country.

VOLUME 19 NUMBER 5/MARCH 8, 1981

Scientific and Technical Aerospace Reports

A Semimonthly Publication of the National Aeronautics and Space Administration

01 AERONAUTICS (GENERAL)

N81-13914* National Aeronautics and Space Administration, Washington, D. C.

AERONAUTICAL ENGINEERING: A CONTINUING BIBLIOGRAPHY WITH INDEXES, SUPPLEMENT 128, NOVEMBER 1980

Nov. 1980 126 p

(NASA-SP-7037(128)) Avail: NTIS HC $15.00 CSCL 01A

This bibliography lists 419 reports, articles, and other documents introduced into the NASA scientific and technical information system in October 1980. Author

N81-13915*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

A STUDY OF THE SONIC-BOOM CHARACTERISTICS OF A BLUNT BODY AT A MACH NUMBER OF 6

George C. Ashby, Jr. Dec. 1980 34 p refs

(NASA-TP-1787; L-14017) Avail: NTIS HC A03/MF A01 CSCL 01B

An experimental and analytical study of the sonic boom static pressure signatures generated by a blunt body at Mach 6 has shown that finite difference computer programs can be used to give reasonable estimates of the signatures. The calculated near field static pressure signature was extrapolated to the far field by a program using the method of characteristics. A comparison of this extrapolated signature with the signature predicted by far field sonic boom theory (linearized) shows that peak overpressures are about the same, at least up to Mach, but the far field theory overestimates the length of the signature. Author

N81-13916# Southern California Association of Governments, Los Angeles

SOUTHERN CALIFORNIA AVIATION SYSTEM STUDY Technical Report, 1978 - 1980

Lawrance H. Goldman, J. Timothy Merwin, Lisa D. Murphy, and Walter E. Gillfillan Jul. 1980 237 p refs

(PB80-215544) Avail: NTIS HC A11/MF A01 CSCL 13B

Southern California's 1995 air travel needs are examined. Existing and planned air carrier airports are restricted by policy constraints and cannot accommodate the air travel demand forecast for 1995. Seven overall strategies, joint civilian/ military use of an existing military facility, removal or revision of the policy constraints, a new air carrier airport are described. Alternative airport sites are evaluated for market attractiveness, noise impacts, airspace workability, financial feasibility, etc. GRA

N81-13917*# New Mexico Univ., Albuquerque. Technology Application Center.

AIRCRAFT MAINTENANCE. CITATIONS FROM THE INTERNATIONAL AEROSPACE ABSTRACTS DATA BASE Progress Report, 1974 - Jul. 1980

Gerald F. Zollars Sep. 1980 84 p Supersedes NTIS/PS-79/0859/3 Sponsored in cooperation with NASA and NTIS

(NASA-CR-163837; PB80-815905; NTIS/PS-79/0859/3) Avail: NTIS HC $30.00/MF $30.00 CSCL 01B

These citations from the international literature concern various aspects of aircraft maintenance. Both military and civil aviation experience are included. Articles cited concern airline operations, engine and avionics reliability, the use of automatic test equipment, maintenance scheduling, and reliability engineering. This updated bibliography contains 347 citations, 85 of which are new additions to the previous edition. GRA

02 AERODYNAMICS

Includes aerodynamics of bodies, combinations, wings, rotors, and control surfaces; and internal flow in ducts and turbomachinery.

For related information see also *34 Fluid Mechanics and Heat Transfer.*

N81-13918*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

WIND-TUNNEL TEST OF AN ARTICULATED HELICOPTER ROTOR MODEL WITH SEVERAL TIP SHAPES

John D. Berry and Raymond E. Mineck Dec. 1980 95 p refs Prepared in cooperation with Army Aviation Research and Development Command, Hampton, Va.

(NASA-TM-80080; L-12774; AVRADCOM-TR-79-49) Avail: NTIS HC A05/MF A01 CSCL 01A

Six interchangeable tip shapes were tested: a square (baseline) tip, an ogee tip, a subwing tip, a swept tip, a winglet tip, and a short ogee tip. In hover at the lower rotational speeds the swept, ogee, and short ogee tips had about the same torque coefficient, and the subwing and winglet tips had a larger torque coefficient than the baseline square tip blades. The ogee and swept tip blades required less torque coefficient at lower rotational speeds and roughly equivalent torque coefficient at higher rotational speeds compared with the baseline square tip blades in forward flight. The short ogee tip required higher torque coefficient at higher lift coefficients than the baseline square tip blade in the forward flight test condition. Author

N81-13919*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

NUMERICAL SOLUTIONS OF THE NAVIER-STOKES EQUATIONS FOR TRANSONIC AFTERBODY FLOWS

R. Charles Swanson, Jr. Dec. 1980 60 p refs

(NASA-TP-1784; L-13826) Avail: NTIS HC A04/MF A01 CSCL 01A

The time dependent Navier-Stokes equations in mass averaged variables are solved for transonic flow over axisymmetric boattail plume simulator configurations. Numerical solution of these equations is accomplished with the unsplit explict finite difference algorithm of MacCormack. A grid subcycling procedure and computer code vectorization are used to improve computational efficiency. The two layer algebraic turbulence models of Cebeci-Smith and Baldwin-Lomax are employed for investigating turbulence closure. Two relaxation models based on these

baseline models are also considered. Results in the form of surface pressure distribution for three different circular arc boattails at two free stream Mach numbers are compared with experimental data. The pressures in the recirculating flow region for all separated cases are poorly predicted with the baseline turbulence models. Significant improvements in the predictions are usually obtained by using the relaxation models. Author

N81-13920*# Boeing Commercial Airplane Co., Seattle, Wash.
A SYSTEM FOR AERODYNAMIC DESIGN AND ANALYSIS OF SUPERSONIC AIRCRAFT. PART 2: USER'S MANUAL Final Contractor Report, Sep. 1978 - Aug. 1980
W. D. Middleton, J. L. Lundry, and R. G. Coleman Washington Dec. 1980 124 p refs
(Contract NAS1-15534)
(NASA-CR-3352; D6-41840-2) Avail: NTIS HC A06/MF A01 CSCL 01C

The system uses linearized theory methods for the calculation of surface pressures and supersonic area rule concepts in combination with linearized theory for calculation of aerodynamic force coefficients. Interactive graphics were included in the system to display or edit input and to permit monitoring and readout of program results. T.M.

N81-13921*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
A COMPUTER PROGRAM FOR THE DESIGN AND ANALYSIS OF LOW-SPEED AIRFOILS, SUPPLEMENT
Richard Eppler (Stuttgart Univ.) and Dan M. Somers Dec. 1980 30 p refs
(NASA-TM-81862) Avail: NTIS HC A03/MF A01 CSCL 01A

Three new options were incorporated into an existing computer program for the design and analysis of low speed airfoils. These options permit the analysis of airfoils having variable chord (variable geometry), a boundary layer displacement iteration, and the analysis of the effect of single roughness elements. All three options are described in detail and are included in the FORTRAN IV computer program. Author

N81-13922*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
PASSIVE CONTROL OF WING/STORE FLUTTER
Wilmer H. Reed, III, F. W. Cazier, Jr., and Jerome T. Foughner, Jr. Dec. 1980 19 p refs Presented at the 5th Joint Tech. Coordinating Group Aircraft Stores Compatibility Symp., St. Louis, 9-11 Sep. 1980
(NASA-TM-81865; L-14010) Avail: NTIS HC A02/MF A01 CSCL 01A

Results are presented for a passive flutter suppression approach known as the decoupler pylon. The decoupler pylon dynamically isolates the wing from store pitch inertia effects by means of soft spring/damper elements assisted by a low frequency feedback control system which minimizes static pitch deflections of the store because of maneuvers and changing flight conditions. Wind tunnel tests and analyses show that this relatively simple pylon suspension system provides substantial increases in flutter speed and reduces the sensitivity of flutter to changes in store inertia and center of gravity. Flutter characteristics of F-16 and YF-17 flutter models equipped with decoupler pylon mounted stores are presented and compared with results obtained on the same model configuration with active flutter suppression systems. These studies show both passive and active concepts to be effective in suppressing wing/store flutter. Also presented are data showing the influence of pylon stiffness nonlinearities on wing/store flutter. Author

N81-13923*# Bihrle Applied Research, Inc., Jericho, N. Y.
ROTARY BALANCE DATA FOR A SINGLE-ENGINE AGRICULTURAL AIRPLANE CONFIGURATION FOR AN ANGLE-OF-ATTACK RANGE OF 8 DEG TO 90 DEG Final Report
William Mulcay and Julio Chu Washington NASA Dec. 1980 243 p refs
(Contract NAS1-14849)
(NASA-CR-3311) Avail: NTIS HC A11/MF A01 CSCL 01A

Aerodynamic characteristics obtained in a helical flow environment utilizing a rotary balance located in the Langley spin tunnel are presented in plotted form for a 1/10 scale single engine agricultural airplane model. The configurations tested include the basic airplane, various wing leading edge and wing tip devices, elevator, aileron, and rudder control settings, and other modifications. Data are presented without analysis for an angle of attack range of 8 deg to 90 deg, and clockwise and counter-clockwise rotations covering a spin coefficient range from 0 to .9. Author

N81-13924# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Goettingen (West Germany). Inst. fuer Experimentelle Stroemungsmechanik.
INVESTIGATION OF A TRANSONIC FLOW OSCILLATION BY REAL-TIME LASER DOPPLER ANEMOMETRY Ph.D. Thesis - Georg-August Univ.
Martin Albers Dec. 1979 80 p refs In GERMAN; ENGLISH summary
(DFVLR-FB-80-04) Avail: NTIS HC A05/MF A01; DFVLR, Cologne DM 13

A real time laser Doppler anemometer (LDA) designed for measurements in unsteady transonic flows and the production of suitable scattering particles are described. An unsteady transonic flow field in a rectangular duct with abrupt increase in cross section is investigated by means of this LDA. A periodically arising flow detachment downstream of the base region is found to be the reason for the large pressure amplitudes. A phase analysis of the velocity oscillations leads to the mode structure of the basepressure oscillation with two nodal planes at one and three quarters of the duct height. The flow instability exciting this oscillation and theoretical models are discussed. E.D.K.

N81-13925# Aeronautical Research Inst. of Sweden, Stockholm. Aerodynamics Dept.
DOWNWASH CALCULATION AT CLOSE RANGE BEHIND A TRAPEZOIDAL WING IN SUPERSONIC FLOW
Anders Hasselrot 1980 37 p refs
(Contract FMV-F-K-80123-78-017-21-001)
(FFA-TN-AU-1661; ISSN-SW-0081-5640) Avail: NTIS HC A03/MF A01

The results were determined as a function of values at the wing trailing edge and at the Trefftz-plane. A correction for off the wing plane points is given. A description of the method, a FORTRAN listing of the coded method and results to be compared with theoretical and experimental values of downwash are presented. T.M.

N81-13926# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Brunswick (West Germany). Abt. Rettungs-und Bergungssysteme.
A CONTRIBUTION TO STABILIZATION OF FLIGHT VEHICLE PARACHUTE SYSTEMS
Christos Saliaris and Dieter Muenscher Apr. 1980 34 p refs In GERMAN; ENGLISH summary Report will also be announced as translation (ESA-TT-679)
(DFVLR-Mitt-80-05) Avail: NTIS HC A03/MF A01; DFVLR, Cologne DM 8,30

The dynamic behavior of the two dimensional motion of a parachute load system was considered. For a mathematical model, the system of nonlinear differential equations was numerically integrated without linearization. For a number of examples with a modified guide surface parachute, the influence of the canopy size, the distance between the attachment point and the canopy, and the distance between the attachment point and the center of gravity of the load on the oscillation of the flight vehicle was studied. T.M.

N81-13927# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Goettingen (West Germany). Inst. fuer Aeroelastik.
UNSTEADY PRESSURE DISTRIBUTION MEASUREMENT ON A ROTATING ELLIPSOID
Karl Kienappel, Horst Stange, and Wolfgang Wagner May 1980 99 p refs In GERMAN; ENGLISH summary
(DFVLR-FB-80-18) Avail: NTIS HC A05/MF A01; DFVLR, Cologne DM 18,50

To prove the validity and the limitation of existing theoretical methods, the unsteady pressure distribution was measured on an oscillating ellipsoid in incompressible flow. The test set up

and the measurement technique are described. The experimental results of the harmonic analysis are given and compared with theoretical methods. A spectral analysis of the pressure signals is included as additional information about the unsteadiness in the region of separated flow. Author

N81-13928# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Goettingen (West Germany). Inst. fuer Theoretische Stroemungsmechanik.

THEORETICAL PREDICTION OF THE BASE PRESSURE FOR TWO-DIMENSIONAL TURBULENT BASE FLOWS AT SUPERSONIC VELOCITIES

Mauri Tanner May 1980 95 p refs In GERMAN; ENGLISH summary Report will also be announced as translation (ESA-TT-674)

(DFVLR-FB-80-19; TT-674) Avail: NTIS HC A05/MF A01; DFVLR, Cologne DM 17,20

The esstential physical foundation of the theory is the theory of Oswatitsch, which gives the connection between the drag of the body and entropy increase in the flow. By comparing the theoretical results with experimental ones, a good agreement between theoretical and experimental base pressures was observed. Author

N81-13929# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Goettingen (West Germany). Abt. Instationaere Aerodynamik.

ANALYSIS OF UNSTEADY PRESSURE MEASUREMENTS ON AN AEROFOIL SECTION WITH AN HARMONICALLY OSCILLATING, SLOTTED FLAP

Karl Kienappel and David F. Round (MBB, Hamburg) Apr. 1980 66 p ref

(DFVLR-FB-80-22) Avail: NTIS HC A04/MF A01; DFVLR, Cologne DM 14,20

An analysis is made of unsteady pressure distribution and aerodynamic coefficients measured for an airfoil and harmonically oscillating slotted control surface in a low speed wind tunnel. The influences on the pressure distribution and aerodynamic coefficients are examined: frequency of oscillation; flap steady deflection; section incidence; flow velocity and slot geometry, i.e. whether the slot is open or closed. There is a carry over between steady and unsteady pressure distributions, which although small at low incidence and flap deflections, becomes more important at higher values, particularly when separation related effects begin to affect the overall flow behavior. Author

N81-13930# Office National d'Etudes et de Recherches Aerospatiales, Paris (France).

REVIEW OF THEORETICAL AND EXPERIMENTAL RESULTS ON THREE DIMENSIONAL TURBULENT WAKES AND BOUNDARY LAYERS

J. Cousteix, B. Aupoix, and G. Pailhas 1980 54 p refs In FRENCH; ENGLISH summary Report will also be announced as translation (ESA-TT-678)

(ONERA-NT-1980-4; ISSN-0078-3781) Avail: NTIS HC A04/MF A01

Various turbulence models were analyzed for boundary layer predictions: mixing length, transport equations for the components of the shear stress. The influence of the shear stress direction was studied. Various solutions are discussed for taking into account the nonalignment between the shear stress and the velocity derivative normal to the wall. Such a nonalignment was also introduced in an integral method. The results of an experiment in a wake which is initially strongly dissymmetric and three dimensional are discussed. They were obtained by detailed measurements of mean velocities and of the six components of the Reynolds stress tensor. Attempts of prediction are discussed. T.M.

N81-13931# ARO, Inc., Arnold Air Force Station, Tenn.

AN EVALUATION OF WIND TUNNEL TEST TECHNIQUES FOR AIRCRAFT NOZZLE AFTERBODY TESTING AT TRANSONIC MACH NUMBERS Final Report, 1 Oct. 1977 - 1 Jan. 1979

T. L. Kennedy AEDC Nov. 1980 184 p refs

(AD-A091775; AEDC-TR-80-8) Avail: NTIS HC A09/MF A01 CSCL 20/4

The results of many experiments to develop and verify wind tunnel test techniques for determining engine exhaust effects on aircraft performance at transonic Mach numbers are summarized. The influence of model support interference, exhaust jet simulation techniques, wind tunnel calibration flow quality and operating conditions, model geometric effects, and measurement techniques in afterbody aerodynamic forces are discussed. Recommendations are given for reducing or eliminating adverse interference effects on wind tunnel test data. GRA

N81-13932# ARO, Inc., Arnold Air Force Station, Tenn.

EVALUATION OF WIND TUNNEL NOZZLE AFTERBODY TEST TECHNIQUES UTILIZING A MODERN TWIN ENGINE FIGHTER GEOMETRY AT MACH NUMBERS FROM 0.6 TO 1.2 Final Report, Oct. 1975 - Sep. 1979

Ernest J. Lucas AEDC Oct. 1980 122 p refs

(AD-A091545; AEDC-TR-79-63) Avail: NTIS HC A06/MF A01 CSCL 01/3

Analyses of surface pressure data from wind tunnel tests conducted in the Propulsion Wind Tunnel (16T) on the 0.1- and 0.2-scale models of the YF-17 aircraft and flight tests conducted at the NASA Dryden Flight Research Center with the prototype YF-17 were conducted to substantiate the effectiveness of the subscale wind tunnel test techniques currently used at AEDC to provide data to evaluate throttle-dependent effects. The data were obtained at Mach numbers 0.6, 0.9, and 1.2 at characteristic Reynolds numbers based on fuselage length from 14 million to 250 million. The data obtained at Mach numbers 0.6 and 0.9 indicate that valid techniques are available to obtain subscale wind tunnel data that are directly applicable to aft-end throttle-dependent flight performance prediction. The wind tunnel plume simulation techniques, however, do not provide data for directly predicting the flight vehicle, aft-end, calculated loads at Mach number 1.2. Additional corrections must be applied to the data to compensate for temperature effects associated with afterburning operations, such as that encountered at Mach 1.2. GRA

03 AIR TRANSPORTATION AND SAFETY

Includes passenger and cargo air transport operations; and aircraft accidents.

For related information see also *16 Space Transportation* and *85 Urban Technology and Transportation.*

N81-13933# Committee on Public Works and Transportation (U. S. House).

AVIATION SAFETY: INTERIOR COMPARTMENT MATERIALS

Washington GPO 1979 373 p Hearings before the Subcomm. on Oversight and Rev. of the Comm. on Public Works and Transportation, 96th Congr., 1st Sess., 25-26 Apr. 1979

(GPO-50-388) Avail: Subcommittee on Oversight and Review

Safety efforts are divided into two aspects: accident prevention and accident survivability, or crashworthiness. The hearings focus on the frequent occurence of postcrash fire in survivable air carrier accidents and on the effect that fire has on the materials which surround the passengers in the aircraft cabin. For individual titles, see N81-13934 through N81-13937.

N81-13934# Committee on Public Works and Transportation (U. S. House).

TESTIMONY OF ELWOOD T. DRIVER, VICE CHAIRMAN, NATIONAL TRANSPORTATION SAFETY BOARD, ACCOMPANIED BY GERRIT J. WALHOUT, CHIEF, HUMAN FACTORS DIVISION, AND MATTHEW M. MCCORMICK, SENIOR AIR SAFETY INVESTIGATOR, HUMAN FACTORS DIVISION

In its Aviation Safety: Interior Compartment Mater. 1979 p 4-64

(For primary document see N81-13933 05-03)

Avail: Subcommittee on Oversight and Review

The importance of fuel ignition prevention, and when this measure fails, the control of fire propagation inside the aircraft, is discussed. Two air carrier accidents investigated by the Safety Board are described. It is recommended by the Board that the FAA conduct research in four specific areas affecting the severity

of injuries of aircraft occupants. These are: (1) containment of flammable fluids, including the fuel, oil, hydraulic fluid, etc.; (2) control of flammable fluids through chemical alteration or the inerting of fuel systems; (3) the reduction or elimination of the toxic effects of burning materials; and (4) improved escape methodology and passenger education. E.D.K.

N81-13935# Committee on Public Works and Transportation (U. S. House).
TESTIMONY OF JAMES J. KRAMER, ASSOCIATE ADMINISTRATOR FOR AERONAUTICS AND SPACE TECHNOLOGY, NATIONAL AERONAUTICS AND SPACE ADMINISTRATION, ACCOMPANIED BY JOHN H. ENDERS, PROJECT MANAGER, AVIATION SAFETY TECHNOLOGY OFFICE, JOHN A. PARKER, CHEMICAL RESEARCH PROJECTS OFFICE, NASA-AMES RESEARCH CENTER, AND DEMITRIUS A. KOURTIDES, CHEMICAL RESEARCH PROJECTS OFFICE, NASA-AMES RESEARCH CENTER
In its Aviation Safety: Interior Compartment Mater. 1979 p 65-158 (For primary document see N81-13933 05-03)
Avail: Subcommittee on Oversight and Review CSCL 01C

The materials system development program FIREMEN (Fire Resistant Materials Engineering) is described. The program is carried out through contracts with the major aircraft manufacturers whereby they are funded to test and evaluate these advanced material systems under the real constraints of state of the art manufacturing processes, production schedules, costs, weight, and so forth. E.D.K.

N81-13936# Committee on Public Works and Transportation (U. S. House).
TESTIMONY OF RICHARD W. TAYLOR, VICE PRESIDENT AND SPECIAL ASSISTANT TO THE PRESIDENT, AND EUGENE A. BARA, CHIEF ENGINEER, PAYLOADS SYSTEMS, BOEING COMMERCIAL AIRPLANE COMPANY
In its Aviation Safety: Interior Compartment Mater. 1979 p 159-297 (For primary document see N81-13933 05-03)
Avail: Subcommittee on Oversight and Review

A brief review of the Boeing aircraft interior materials and fire test methods development programs is given. This activity has gone on for many years and contributed to the AIA crashworthiness program in 1968. As a result of these activities, the 747 was designed and built using the latest available technology, thereby establishing the requirements for wide body jet transports. Boeing's program in interior materials has continued and the highlights of the last five years are reviewed. E.D.K.

N81-13937# Committee on Public Works and Transportation (U. S. House).
TESTIMONY OF A PANEL CONSISTING OF: LLOYD E. FRISBEE, VICE PRESIDENT, ENGINEERING AND OPERATIONS, LOCKHEED CALIFORNIA COMPANY; LYLE A. WRIGHT, DIRECTOR, POWERPLANT ENGINEERING, DOUGLAS AIRCRAFT COMPANY, ACCOMPANIED BY DOCTOR H. C. SCHJELDERUP, CHIEF TECHNOLOGY ENGINEER, MATERIALS AND PROCESS ENGINEERING, AND F. E. DUSKIN, SENIOR DESIGN ENGINEER, INTERIORS ENGINEERING, DOUGLAS AIRCRAFT COMPANY
In its Aviation and Safety: Interior Compartment Mater. 1979 p 298-370 (For primary document see N81-13933 05-03)
Avail: Subcommittee on Oversight and Review

Lockheed has conducted programs to improve aircraft material flame resistance and develop advanced techniques for firesafety testing in coordinated programs with other airframe companies, materials suppliers, and NASA. During this time, Lockheed has had active, continuous liaison with governmental agencies to develop firesafety testing techniques, study the feasibility and trade offs for advanced aircraft fire management systems, and seek meaningful and productive areas of research and development in aircraft fire safety. Active support and participation was also maintained in technical committee work such as ASTM-F7 Committee on Aerospace Test Methods to standardize on flammability, smoke, and other combustion byproducts test techniques and to perform inter-laboratory comparison testing of flammability and smoke emission methods. Improved flammability and smoke test techniques have contributed to substantial improvements in flame resistance of aircraft interior construction material in all categories and an order of magnitude reduction in smoke emission of materials. In other words, the smoke emission was reduced by an order of 10 times in the last few years. E.D.K.

N81-13938# Naval Weapons Center, China Lake, Calif.
AN INVESTIGATION OF SAFETY HAZARDS AND RELIABILITY PROBLEMS IN AERIAL REFUELING STORES Final Report, Mar. - Jul. 1980
Leo D. Budd Aug. 1980 70 p refs
(AD-A091788; AD-E900014; NWC-TP-6218) Avail: NTIS HC A04/MF A01 CSCL 01/2

An investigation was conducted to identify sources of safety hazards and reliability problems in model D-704 aerial refueling stores. A failure modes and effects analysis was performed on the D-704. Mishap data, safety UR (unsatisfactory report) data, and 3-M (maintenance and material management) data were analyzed to identify historical problems. Comparisons of model 31-300 failure statistics to model D-704 failure statistics is included. GRA

N81-13939# Rome Air Development Center, Griffiss AFB, N.Y.
THE FEDERAL AVIATION ADMINISTRATION LIGHTNING PROTECTION MODULES DESIGNED FOR LEADLESS DEVICES
Richard M. Cosel and Manuel Figueroa May 1980 49 p refs
(Contract DOT-FA72WAI-356; AF Proj. 9567)
(AD-A091642; FAA-RD-80-119) Avail: NTIS HC A03/MF A01 CSCL 09/1

The silicon avalanche diode transient suppressor is widely used to protect low level solid state devices against voltage transients. There has been a problem, however, in providing suitable low loss, low inductive installation mountings especially in retrofit cases. This report describes tow mounting systems developed for the FAA, a barrier strip designated FA9455, for direct current, pulsed or audio lines and coaxial holder designated FA9479 for 50 or 72 ohm video or F.R. lines. Tests were performed using both conventionally constructed suppressors and low capacity units at voltage ratings varying from 6.8 volts to over 50 volts and including bipolar and unipolar devices. Square wave tests on the barrier strip, insertion loss tests on the coaxial module and surge testing of both modules indicated that within test parameters, the devices are limited only by the capabilities of the square suppressor used, i.e. they are device limited. GRA

N81-13940# Boeing Military Airplane Development, Seattle, Wash. Aircrew Escape Group.
ADVANCED EJECTION SEAT FOR HIGH DYNAMIC PRESSURE ESCAPE. WIND TUNNEL TEST Final Report, 15 Aug. 1979 - 20 May 1980
John O. Bull, David T. Ther, and Roger F. Yurczyk Aug. 1980 139 p refs
(Contract F33615-79-C-3406; AF Proj. 2402)
(AD-A091810; AFWAL-TR-80-3084) Avail: NTIS HC A07/MF A01 CSCL 01/3

Wind tunnel tests were conducted to evaluate new high dynamic pressure protective devices incorporated into a conventional ejection seat. These tests are part of a development program 'Advanced Ejection Seat for High Dynamic Pressure Escape'. The objectives of this program are to develop an ejection seat design which will provide safe escape during emergency conditions encountered throughout the performance envelope of an aircraft with speed capability to 687 KEAS. Preliminary phases of this program have resulted in selection and definition of a windblast shield, an aft body drag reduction boom, a horizontal stabilizer and a flow diverter. These devices were incorporated into a one-half scale ejection seat/crewmember model and were tested in the AEDC PWT 16-T transonic tunnel. Aerodynamic data derived from these tests are being used in six-degree-of-freedom computer simulations for performance assessments of the ejection seat configurations. GRA

04 AIRCRAFT COMMUNICATIONS AND NAVIGATION

Includes digital and voice communication with aircraft; air navigation systems (satellite and ground based); and air traffic control.

For related information see also *17 Spacecraft Communications, Command, and Tracking* and *32 Communications*.

N81-13941*# Quinby (Gilbert F.), Fort Washington, Pa.
AN ASSESSMENT OF GENERAL AVIATION UTILIZATION OF ADVANCED AVIONICS TECHNOLOGY Final Report
Gilbert F. Quinby Dec. 1980 38 p
(NASA Order L-11593)
(NASA-CR-159328) Avail: NTIS HC A03/MF A01 CSCL 17G

Needs of the general aviation industry for services and facilities which might be supplied by NASA were examined. In the data collection phase, twenty-one individuals from nine manufacturing companies in general aviation were interviewed against a carefully prepared meeting format. General aviation avionics manufacturers were credited with a high degree of technology transfer from the forcing industries such as television, automotive, and computers and a demonstrated ability to apply advanced technology such as large scale integration and microprocessors to avionics functions in an innovative and cost effective manner. The industry's traditional resistance to any unnecessary regimentation or standardization was confirmed. Industry's self sufficiency in applying advanced technology to avionics product development was amply demonstrated. NASA research capability could be supportive in areas of basic mechanics of turbulence in weather and alternative means for its sensing. Author

N81-13942# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany). Abteilung Regelungssysteme.
THE COLLISION COURSE: CONDITIONS, GUIDANCE LAWS AND PROPERTIES
Winfried Hofmann Jan. 1980 108 p refs In GERMAN; ENGLISH summary
(DFVLR-FB-80-06) Avail: NTIS HC A06/MF A01; DFVLR, Cologne DM 18,40

An evaluation of the influence of distinct missile properties (acceleration phase, lead single constraints and maneuverability) and real world disturbances on the properties and requirements of collision course guidance is presented. For proportion navigation guidance, comprehensive diagrams are presented to evaluate the terminal miss behavior, the requirements on the missile and on a line of sight angular rate measuring sensor. Missile dynamics, initial alignment errors, target maneuvers and target aspect-angle caused measurement errors were considered as real world disturbances. Author

N81-13943# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany). Abt. Regelungssysteme.
EXTENSION OF PROPORTIONAL NAVIGATION BY USE OF OPTIMAL FILTERING AND CONTROL METHODS
Hans-Dieter Joos Mar. 1980 39 p refs In GERMAN; ENGLISH summary Report will also be announced as translation (ESA-TT-683)
(DFVLR-FB-80-10; TT-683) Avail: NTIS HC A03/MF A01; DFVLR, Cologne DM 8,30

The method of optimal filtering, providing estimates of system state variables from noisy measurements, makes it possible to develop more sophisticated guidance laws, compared to conventional proportional navigation. For a homing missile which is described by a simplified model, a Kalman-Bucy Filter is designed taking into account nonlinearities and target maneuvers. Based on this filter, a guidance law is proposed, which uses the method of quadratic optimal control for parameter determination, but avoids its known disadvantages, that is, time-to-go dependency and high numerical effort. Simulation shows a considerable improvement of miss distance behavior. Author

N81-13944# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Brunswick (West Germany). Inst. fuer Flugmechanik.
MIDAIR AND NEAR MIDAIR COLLISIONS ON TWO- AND THREE-DIMENSIONAL CURVILINEAR FLIGHT PATHS
Otto Weber Mar. 1980 108 p refs In GERMAN; ENGLISH summary Report will also be announced as translation (ESA-TT-685)
(DFVLR-FB-80-13) Avail: NTIS HC A06/MF A01; DFVLR, Cologne DM 21

Collision avoidance by means of the 'see and avoid' concept, advanced secondary radar systems on the ground, and independent electronic systems onboard is discussed. For two- and three-dimensional stationary turns, basic geometrical and physical aspects of conflict detection were derived and details given on the apparent size and motion of the other airplane on the windshield. For conflict warning by means of electronic systems on the ground or onboard, a linear track model was used. T.M.

N81-13945# Federal Aviation Administration, Atlantic City, N.J.
FLIGHT TEST INVESTIGATION OF LORAN-C FOR EN ROUTE NAVIGATION IN THE GULF OF MEXICO Final Report
Robert Pursel Sep. 1980 102 p
(FAA Proj. 045-390-130)
(AD-A091637; FAA-CT-80-18; FAA-RD-80-47) Avail: NTIS HC A06/MF A01 CSCL 17/7

Flight tests of a long range navigation (LORAN-C) airborne navigator were conducted in the Gulf of Mexico oil exploration and production area. Two systems were installed in a CV-580 aircraft to examine simultaneously the performance from two different LORAN-C triads. Four separate test routes were flown over a period of 3 days. These routes covered the eastern, central, and western test areas, and an overland route from Houston, Texas, to Lafayette, Louisiana. An inertial navigation system (INS) was used as a position reference standard. The INS data were updated to correct for drift. Accuracy of the position reference from the corrected INS data was - or - 0.3 nautical miles (nmi). The flight test data collected indicated that both the Malone, Raymondville, Jupiter and the Malone, Raymondville, Grangeville triads provided en route LORAN-C navigation capability which met Federal Aviation Administration (FAA) Advisory Circular AC-90-45A accuracy requirements except when operating near the baseline extension of the Malone Grangeville baseline when using the Malone, Raymondville, Grangeville triad. GRA

N81-13946*# New Mexico Univ., Albuquerque. Technology Application Center.
INERTIAL NAVIGATION AND GUIDANCE. CITATIONS FROM THE INTERNATIONAL AEROSPACE ABSTRACTS DATA BASE Progress Report, 1976 - Jul. 1980
Samuel C. Mauk Sep. 1980 68 p Supersedes NTIS/PS-79/0825 Sponsored in part by NASA and NTIS
(NASA-CR-163838; PB80-815640; NTIS/PS-79/0825) Avail: NTIS HC $30.00/MF $30.00 CSCL 17G

A bibliography containing 263 citations is presented which addresses all aspects of inertial navigation and guidance. Included are articles concerning air navigation, navigation instruments and aids, aircraft guidance, missile control, strapdown inertial guidance, gyroscopes, stabilized platforms, position and instrument errors, error analysis, and accelerometers. Civil, commercial and military applications are covered. GRA

N81-13947# National Technical Information Service, Springfield, Va.
MICROWAVE LANDING SYSTEMS. CITATIONS FROM THE ENGINEERING INDEX DATA BASE Progress Report, 1970 - Jun. 1980
Williiam E. Reed Sep. 1980 105 p Supersedes NTIS/PS-79/0778; NTIS/PS-78/0732
(PB80-814643; NTIS/PS-79/0778; NTIS/PS-78/0732) Avail: NTIS HC $30.00/MF $30.00 CSCL 17G

The bibliography cites reports from worldwide research on the planning development, and operation of microwave landing systems, including feasibility, systems engineering, equipment, signal propagation, and cost analysis. This updated bibliography contains 100 abstracts, 11 of which are new entries to the previous edition. GRA

N81-13948# National Technical Information Service, Springfield, Va.
MICROWAVE LANDING SYSTEMS. CITATIONS FROM THE NTIS DATA BASE Progress Report, 1964 - Jun. 1980
William E. Reed Sep. 1980 205 p Supersedes NTIS/PS-79/0777; NTIS/PS-78/0731
(PB80-814635; NTIS/PS-79/0777; NTIS/PS-78/0731) Avail: NTIS HC $30.00/MF $30.00 CSCL 17G

Federally sponsored research on the planning, development, and operation of aircraft microwave landing systems, is presented. Studies include feasibility, systems engineering, equipment, signal propagation, and cost analysis. This updated bibliography contains 181 abstracts, 35 of which are new entries to the previous edition. GRA

N81-13949# Automation Industries, Inc., Silver Spring, Md. Vitro Labs.
WIND SHEAR SYSTEMS INTEGRATION PLAN, VICON (VISUAL CONFIRMATION) RELIABILITY ANALYSIS Final Report
Charles W. Hamby and James R. DeMattio Feb. 1980 74 p (Contract DOT-FA79WA-4279)
(PB80-218233; VITRO/JOB-03021-03540; FAA-RD-80-61) Avail: NTIS HC A04/MF A01 CSCL 17G

The reliability of a visual confirmation system which visually confirmed that an aircraft awaiting takeoff has been verbally cleared for takeoff by the airport controller is examined. It is found that the predicted availability of the VICON system as installed at Bradley International Airport is 99.94% for the seven month test period. It is also found that the number of spare parts to provide a 99% assurance that there will be no degradation of VICON system performance due to a lack of spare parts over 6 months is predicted to be sixty-three total spares covering twenty-seven different component types. Thirty percent of the spares are required for the controller's operating switches. GRA

05 AIRCRAFT DESIGN, TESTING AND PERFORMANCE

Includes aircraft simulation technology.

For related information see also *18 Spacecraft Design, Testing and Performance* and *39 Structural Mechanics.*

N81-13950# Messerschmitt-Boelkow-Blohm G.m.b.H., Ottobrunn (West Germany). Theorgtische Aerodynamik.
COMPUTATIONAL AERODYNAMIC DESIGN TOOLS AND TECHNIQUES USED AT FIGHTER DEVELOPMENT
P. Sacher, W. Kraus, and R. Kunz 6 Sep. 1979 54 p refs Presented at Meeting SMP of AGARD., Neubiberg, Germany, 3-6 Sep. 1979
(MBB-FE-122/S/PUB/13) Avail: NTIS HC A04/MF A01

Configuration optimization, component design, and experimental proof in fighter design are summarized. Requirements for supersonic performance, including supersonic drag reduction and canard tail design, were reviewed. The main aerodynamic principles in use throughout the aircraft industry are described. T.M.

N81-13951# Technische Hogeschool, Delft (Netherlands). Dept. of Aerospace Engineering.
FUNDAMENTALS OF CONCEPTUAL DESIGN OPTIMIZATION OF SUBSONIC TRANSPORT AIRCRAFT
E. Torenbeek Aug. 1980 173 p refs
(VTH-LR-292) Avail: NTIS HC A04/MF A01

Various merit functions and feasible design program structures are discussed and program elements common to most design exercises were analyzed. Criteria for optimum cruise conditions are presented for aircraft with or without Mach number dependent drag polars and arbitrary propulsion systems. Constrained and unconstrained optima for design cruise speed and altitude, engine thrust, wing loading, aspect ratio and lift coefficient are presented in the form of generalized analytical expressions. Different criteria were found when engines were sized for optimum cruising flight or for specified low speed performance. A generalized cruise performance analysis is presented for modern turbofan and propeller aircraft, resulting in new criteria for optimum flight conditions. A detailed account of the aircraft mass breakdown sensitivity to parametric variations, derivations for the payload fraction, and partial (constrained) and global optima were derived. Some opportunities for improvements and extended applications to non-conventional and advanced designs are discussed briefly. T.M.

N81-13952# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Brunswick (West Germany). Abt. Entwurfsaerodynamik.
LAMINAR-AIRFOILS FOR TRANSPORT AIRCRAFT
Armin Quast Mar. 1980 34 p refs In GERMAN; ENGLISH summary Report will also be announced as translation (ESA-TT-680)
(DFVLR-Mitt-80-07; ESA-TT-680) Avail: NTIS HC A03/MF A01; DFVLR, Cologne DM 8,30

Wing sections with laminar flow and their effects on fuel consumption are discussed. It was shown that laminarization by section shape is possible at certain Reynolds numbers and at reduced Mach numbers. T.M.

N81-13953# Southwest Research Inst., San Antonio, Tex. Army Fuels and Lubricants Research Lab.
REDUCTION OF EXHAUST SMOKE FROM GAS-TURBINE ENGINES BY USING FUEL EMULSIONS Final Report
C. A. Moses, C. W. Coon, and P. A. Altavilla (Naval Air Engineering Center, Lakehurst, N.J.) 21 Oct. 1980 92 p refs
(Contract N68335-76-C-1136; WF5752401)
(AD-A091777; AFLRL-84; NAEC-92-114) Avail: NTIS HC A05/MF A01 CSCL 21/5

Low-internal-phase ratio emulsions of water-in-fuel have been investigated for their potential in reducing exhaust smoke from gas turbine engines. The unique mechanism is the selective vaporization of the internal phase during the period of droplet heating. Experiments were conducted in a combustor facility fabricated from T-63 engine hardware using a single can combustor with a dual orifice pressure atomizer. Two series of tests were performed. The initial sequence employed air flow conditions that simulated full engine power (the smokiest condition). During the experiments, the fuel specifications, water concentration, surfactant concentration, and dispersion size were varied, and measurements of exhaust smoke, combustor temperature rise, flame radiation, and combustion efficiency based upon exhaust chemistry were obtained. The initial series of experiments suggested that a 48 percent reduction in exhaust particulate concentration, based upon a correlation due to Champagne, was possible with an emulsion having a water-to-fuel ratio of 0.1. The later series of tests was oriented toward optimization of the water concentration for smoke reduction and examination of the complete engine power spectrum. GRA

N81-13954# System Planning Corp., Arlington, Va.
A SURVEY OF SIMULATION AND TEST RESULTS FOR ASSESSING RPV PERFORMANCE IN A WBIC ENVIRONMENT Final Report
M. H. Crowell Jul. 1980 59 p refs
(Contract DAAK50-80-C-0011)
(AD-A091603; SPC-615) Avail: NTIS HC A04/MF A01 CSCL 71/8

This report identifies salient test results and recommends selected models that can be used for estimating Remotely Piloted Vehicle (RPV) mission payload performance in the presence of weather and battle induced contaminants in operational scenarios. The effect of weather and battle induced contaminants (WBIC) on RPV payload performance must be evaluated for each of the missions that the RPV is expected to perform. For purposes of this analysis, five missions are defined: (1) Target acquisition; Detecting, recognizing, and identifying enemy elements and providing their location for immediate response by fire support. (2) Target designation; Using laser designators to illuminate hard point targets for engagement with laser guided weapons such as Copperhead and Hellfire. (In addition, the RPV can designate target areas for acquisition by laser spot trackers such as the Air Force's Pave Penny system.) (3) Artillery adjustment; Functioning as (forward observers) and directing or adjusting field artillery fire. (4) Reconnaissance; Obtaining, by visual observation and the laser ranging system, information about the activity and resources of the enemy; or securing data concerning

meteorological, hydrographic, or geographical characteristics of a particular area. (5) Damage assessment: Determining the effects of an attack on a target. GRA

N81-13955# Texas Univ. at Austin. Dept. of Aerospace Engineering and Engineering Mechanics.
THE EFFECTS OF WARHEAD-INDUCED DAMAGE ON THE AEROELASTIC CHARACTERISTICS OF LIFTING SURFACES. VOLUME 1: AEROELASTIC EFFECTS Final Report, 1 Feb. 1979 - 31 Jan. 1980
J. H. Chang and R. O. Stearman Jul. 1980 122 p refs
(Grant AF-AFOSR-3569-78; AF Proj. 2301)
(AD-A091674; AFOSR-80-1039TR) Avail: NTIS HC A06/MF A01 CSCL 01/3

An investigation is being conducted to determine whether ballistic damage can seriously degrade the aeroelastic integrity of lifting surfaces on aircraft. A potential aeroelastic failure mode that was identified in the first year's study has been investigated here over a larger range of parameters. This failure mechanism results from the localized steady drag generated when a lifting surface encounters damage to its aerodynamic shape. Its modeling has been extended in this study to swept wing configurations and to possible multiple and distributed damage sites. In addition, a larger range of single damage site locations has also been considered to assess the possible tradeoffs between the influence of both structural and aerodynamic damage locations. A check on the validity of the strip theory aerodynamic modeling employed in this study has also been made by comparing these results with those obtained from a lifting surface theory modeling. Finally, an additional failure mechanism is identified that results from any unsteady but periodic fluctuating aerodynamic drag loads that are generated by the damage. A parametric and oscillatory instability can be induced by relatively low level drag loads in this case if they happened to be appropriately tuned to the structural frequencies of the wing. GRA

N81-13956# Federal Aviation Administration, Oklahoma City, Okla. Standards Development Branch.
CURRENT AIRCRAFT SURVEY (APPROACH SPEEDS, GROSS WEIGHTS, AND DIMENSIONS)
Frank Parr Jul. 1980 36 p
(Proj. AFS-560-79-17)
(PB80-225691; FAA-AFO-500-20) Avail: NTIS HC A03/MF A01 CSCL 01B

A survey of current aircraft was conducted to determine the effect of a revision to FAR 97.3. The revision deleted the use of gross weight in categorization of aircraft for instrument approach minimums. Of 237 aircraft types and models of 22 nations surveyed, 180 were not affected by the rule change. Of the affected aircraft, 31 changed from Category D to C, one from D to B, one from D to A, 17 to C to B, three from C to A, and four from B to A. Ten aircraft types have series which fall into two categories. GRA

N81-13957*# New Mexico Univ., Albuquerque. Technology Application Center.
TECHNOLOGICAL FORECASTING--AIRCRAFT DESIGN. CITATIONS FROM THE INTERNATIONAL AEROSPACE ABSTRACTS DATA BASE Progress Report, 1974 - Aug. 1980
Gerald F. Zollars and Mary K. Gallagher Sep. 1980 45 p Supersedes NTIS/PS-79/1017 Sponsored in part by NASA and NTIS
(NASA-CR-163833; PB80-815970; NTIS/PS-79/1017) Avail: NTIS HC $30.00/MF $30.00 CSCL 01C

Technological forecasts of aircraft design are discussed in approximately 162 citations. Forecasts dealing with the configuration of both civil and military aircraft are included. Specific topics stressed are fuel consumption, avionics, and cost and noise reduction. GRA

06 AIRCRAFT INSTRUMENTATION

Includes cockpit and cabin display devices; and flight instruments.

For related information see also *19 Spacecraft Instrumentation* and *35 Instrumentation and Photography*.

N81-13958*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
EVALUATION OF A COMPUTER-GENERATED PERSPECTIVE TUNNEL DISPLAY FOR FLIGHT PATH FOLLOWING
Arthur J. Grunwald, James B. Robertson, and Jack J. Hatfield Dec. 1980 100 p refs
(NASA-TP-1736; L-13253) Avail: NTIS HC A06/MF A01 CSCL 01D

The display was evaluated by monitoring pilot performance in a fixed base simulator with the vehicle dynamics of a CH-47 tandem rotor helicopter. Superposition of the predicted future vehicle position on the tunnel image was also investigated to determine whether, and to what extent, it contributes to better system performance (the best predicted future vehicle position was sought). Three types of simulator experiments were conducted: following a desired trajectory in the presence of disturbances; entering the trajectory from a random position, outside the trajectory; detecting and correcting failures in automatic flight. The tunnel display with superimposed predictor/director symbols was shown to be a very successful combination, which outperformed the other two displays in all three experiments. A prediction time of 4 to 7 sec. was found to optimize trajectory tracking for the given vehicle dynamics and flight condition. Pilot acceptance of the tunnel plus predictor/director display was found to be favorable and the time the pilot needed for familiarization with the display was found to be relatively short. Author

N81-13959*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
DEVELOPMENT OF A COMPUTER PROGRAM DATA BASE OF A NAVIGATION AID ENVIRONMENT FOR SIMULATED IFR FLIGHT AND LANDING STUDIES
Hugh P. Bergeron, Alix T. Haynie (Georgia Inst. of Tech.), and James B. McDede (Embry-Riddle Aeronautical Inst.) Nov. 1980 35 p refs
(NASA-TM-80064) Avail: NTIS HC A03/MF A01 CSCL 17G

A general aviation single pilot instrument flight rule simulation capability was developed. Problems experienced by single pilots flying in IFR conditions were investigated. The simulation required a three dimensional spatial navaid environment of a flight navigational area. A computer simulation of all the navigational aids plus 12 selected airports located in the Washington/Norfolk area was developed. All programmed locations in the list were referenced to a Cartesian coordinate system with the origin located at a specified airport's reference point. All navigational aids with their associated frequencies, call letters, locations, and orientations plus runways and true headings are included in the data base. The simulation included a TV displayed out-the-window visual scene of country and suburban terrain and a scaled model runway complex. Any of the programmed runways, with all its associated navaids, can be referenced to a runway on the airport in this visual scene. This allows a simulation of a full mission scenario including breakout and landing. R.C.T.

N81-13960# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Brunswick (West Germany). Abteilung Flugsimulation.
EQUIPMENT FOR TESTING AND MEASURING A 'HELMET MOUNTED SIGHT AND DISPLAY' SYSTEM WITH A COUPLED MOVABLE TELEVISION CAMERA IN THE FLIGHT-SIMULATOR FOR RESEARCH OF THE DFVLR
R. Dierke, Friedrich Erdmann, E. Biertuempel, R. Ehlers, and H. Loehr Jan. 1980 81 p refs In GERMAN; ENGLISH summary Report will also be announced as translation (ESA-TT-675)
(DFVLR-Mitt-80-04) Avail: NTIS HC A05/MF A01

Equipment for testing a helmet mounted sight and display system (HMS/D) in a flight simulator is described. After defining the values to be measured and the corresponding reference values, the software and hardware of the testing equipment is described, as well as the control program of the equipment and the methods of data recording. Special aspects of the mathematical background and measurement of static errors of a HMS/D System (Honeywell) are given in the appendices. E.D.K.

N81-13961# General Electric Co., Wilmington, Mass. Aerospace Instruments and Electrical Systems Dept.
ACOUSTIC FUEL QUANTITY MEASUREMENT SYSTEM. SIGNAL CONDITIONING UNIT Final Report, 1 Oct. 1978 - 31 Jan. 1980
B. D. Keller, C. R. Mayer, and B. Blanter 16 May 1980 44 p refs
(Contract N62269-78-C-0433; WF41400000)
(AD-A091758; NADC-78187-60) Avail: NTIS HC A03/MF A01 CSCL 14/2

This report summarizes work performed by the General Electric Company on contract N62269-78-C-0433 to design, fabricate and test a fuel quantity Signal Conditioning Unit. This equipment was designed, fabricated, integrated with other components and tested on schedule. The results of the test program demonstrates that the concept of using a microprocessor to compute fuel mass to Class III gauging accuracies, based on inputs from linear acoustic probes and a densitometer, is valid. GRA

07 AIRCRAFT PROPULSION AND POWER

Includes prime propulsion systems and systems components, e.g., gas turbine engines and compressors; and on-board auxiliary power plants for aircraft.

For related information see also *20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *44 Energy Production and Conversion.*

N81-13962 Rolls-Royce Ltd., Derby (England). Non-Metallics Lab.
THE COMPRESSION MOULDING OF COMPOSITE AERO ENGINE COMPONENTS WITH ELEVATED THERMAL STABILITY
F. C. Johnson 1980 10 p refs
(PNR-90036) Avail: NTIS HC A02/MF A01

An historical background of the RB162 booster engine is outlined, and the development of glass reinforced composite components with improved thermal stability is described. The processing modifications required in the utilization of Kerimid 601 bismaleimide resin for matched die moulding of small complex shapes are discussed. The advantages, complexities, and problems associated with the new materials are shown, and a comparison of behavior under stress of epoxy-novolak and polyimide rotor blades was made. Author

N81-13963*# Teledyne Continental Motors, Mobile, Ala. Aircraft Products Div.
ADVANCED TECHNOLOGY SPARK-IGNITION AIRCRAFT PISTON ENGINE DESIGN STUDY Final Report
Kenneth J. Stuckas Nov. 1980 127 p refs
(Contract NAS3-21272)
(NASA-CR-165162) Avail: NTIS HC A07/MF A01 CSCL 21G

The advanced technology, spark ignition, aircraft piston engine design study was conducted to determine the improvements that could be made by taking advantage of technology that could reasonably be expected to be made available for an engine intended for production by January 1, 1990. Two engines were proposed to account for levels of technology considered to be moderate risk and high risk. The moderate risk technology engine is a homogeneous charge engine operating on avgas and offers a 40% improvement in transportation efficiency over present designs. The high risk technology engine, with a stratified charge combustion system using kerosene-based jet fuel, projects a 65% improvement in transportation efficiency. Technology enablement program plans are proposed herein to set a timetable for the successful integration of each item of required advanced technology into the engine design. Author

N81-13964# Rolls-Royce Ltd., Derby (England).
THE FUTURE OF CIVIL TURBO-FAN ENGINES
A. G. Newton and J. F. Coplin 1980 41 p
(PNR-90034) Avail: NTIS HC A03/MF A01

The scarcity of fuel and rapidly increasing fuel prices means that there will be ever increasing pressure to reduce the fuel consumption of commercial aeroengines. The present generation of large fan engines has consolidated significant improvements in this respect compared with the engines it replaced. The fuel consumption of this class of engines can be greatly reduced (by amount 12-15 percent) by adopting a derivative approach and, in the longer term, by a further 10 percent by more radical changes. The methods by which the current performance was achieved are described. Author

N81-13965# General Electric Co., Lynn, Mass. Aircraft Engine Group.
REGENERATIVE ENGINE ANALYSIS Final Report
R. P. Tameo, P. W. Vinson, and R. E. Neitzel Oct. 1980 139 p refs
(Contract DAAK51-79-C-0055; DA Proj. 1L1-62209-AH-76)
(AD-A091755; R80-AEG049; USAAVRADCOM-TR-80-D-18)
Avail: NTIS HC A07/MF A01 CSCL 21/5

This report summarizes the results of a regenerative turboshaft study. The work was performed in two tasks. Task I was a 4-month parametric study of cyclic and recuperator design parameters leading to the selection of those parameters providing minimum fuel consumption and life-cycle cost. Task II consisted of a 2-month preliminary design of a selected regenerative engine cycle. GRA

N81-13966# School of Aerospace Medicine, Brooks AFB, Tex. Aerospace Medical Div.
ORGANIC COMPOUNDS IN THE EXHAUST OF A J85-5 TURBINE ENGINE Interim Report, Jan. - Sep. 1978
James P. Conkle, William W. Lackey, Charles L. Martin, and Andrew Richardson, III Sep. 1980 35 p refs
(AF Proj. 7930)
(AD-A091712; SAM-TR-80-29) Avail: NTIS HC A03/MF A01 CSCL 21/2

Information related to exhaust hydrocarbons associated with a J85-5 turbine engine is presented. A comparison of two sampling techniques (cryogenic trapping and sorption tube) is discussed. The collected samples were analyzed by coupled gas chromatograph-mass spectrometer-data system. The number of compounds identified in the samples was 231, with equivalent results from the two sampling techniques. Less than half of the compounds identified were aromatic and oxygenated species. GRA

N81-13967# Army Materials and Mechanics Research Center, Watertown, Mass. Ceramics Research Div.
SOME ASPECTS OF MATERIALS AND STRUCTURES ENGINEERING WITH CERAMICS FOR ENGINE APPLICATIONS Final Report
R. Nathan Katz Jul. 1980 28 p refs Presented at 3rd Intern. Conf. on Mech. Behavior of Mater., Cambridge, England, 20 Aug. 1979
(AD-A091547; AMMRC-MS-80-3) Avail: NTIS HC A03/MF A01 CSCL 11/2

This paper identifies the benefits of the use of ceramics in heat engines, how one designs with brittle materials, and some key materials for heat engine application. Current engineering and materials problems in the use of ceramics for engine applications are summarized. Examples of how the materials science and engineering community is addressing two of these problems: time and environmental dependence of properties, and development of improved high temperature (ca 1400 C) materials, are presented. A case history of a successful design of a ceramic engine component is also presented. Finally, progress on a variety of ceramic engine programs is reviewed. GRA

08 AIRCRAFT STABILITY AND CONTROL

Includes aircraft handling qualities; piloting; flight controls; and autopilots.

N81-13968*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

ECONOMIC EVALUATION OF FLYING-QUALITIES DESIGN CRITERIA FOR A TRANSPORT CONFIGURED WITH RELAXED STATIC STABILITY

Steven M. Sliwa Dec. 1980 30 p refs
(NASA-TP-1760; L-13944) Avail: NTIS HC A03/MF A01 CSCL 01C

Direct constrained parameter optimization was used to optimally size a medium range transport for minimum direct operating cost. Several stability and control constraints were varied to study the sensitivity of the configuration to specifying the unaugmented flying qualities of transports designed to take maximum advantage of relaxed static stability augmentation systems. Additionally, a number of handling qualities related design constants were studied with respect to their impact on the design. Author

N81-13969*# Calspan Advanced Technology Center, Buffalo, N.Y.

LANDING FLYING QUALITIES EVALUATION CRITERIA FOR AUGMENTED AIRCRAFT Final Report

Robert C. Radford, Roger Smith, and Randall Bailey Jun. 1980 99 p refs
(Contract NAS4-2534)
(NASA-CR-163097; CALSPAN-6339-F-3) Avail: NTIS HC A05/MF A01 CSCL 01C

The criteria evaluated were: Calspan Neal-Smith; Onstott (Northrop Time Domain); McDonnell-Douglas Equivalent System Approach; R. H. Smith Criterion. Each criterion was applied to the same set of longitudinal approach and landing flying qualities data. A revised version of the Neal-Smith criterion which is applicable to the landing task was developed and tested against other landing flying qualities data. Results indicated that both the revised Neal-Smith criterion and the Equivalent System Approach are good discriminators of pitch landing flying qualities; Neal-Smith has particular merit as a design guide, while the Equivalent System Approach is well suited for development of appropriate military specification requirements applicable to highly augmented aircraft. Author

N81-13970# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany). Inst. fuer Dynamik der Flugsysteme.

APPLICATION OF VECTOR PERFORMANCE OPTIMIZATION TO A ROBUST CONTROL LOOP DESIGN FOR A FIGHTER AIRCRAFT

Gerhard Kreisselmeier and Reinhold Steinhauser Apr. 1980 70 p refs In GERMAN; ENGLISH summary
(DFVLR-FB-80-14) Avail: NTIS HC A05/MF A01; DFVLR, Cologne DM 13,20

For a McDonnell-Douglas F-4C aircraft a robust, fixed gain controller is designed, which provides satisfying handling qualities of the longitudinal motion of the aircraft over the complete flight range without gain scheduling. Robustness is achieved in the sense of covering large parameter variations and providing good gain and phase margins. Only low control rates and low feedback gains are involved. The results are obtained by application of a performance vector optimization design method which permits a great many different design objectives simultaneously and in a highly systematic fashion. Two different designs are presented placing emphasis on pitch rate control and normal acceleration control. E.D.K.

N81-13971# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Brunswick (West Germany). Abt. Flaechenflugzeuge.

SYSTEM IDENTIFICATION OF THE LONGITUDINAL MOTION OF THE DFVLR HFB 320 RESEARCH AIRCRAFT WITH PARTICULAR CONSIDERATION OF CONTROL SURFACE EFFECTIVENESS

Ohad Rix Jul. 1979 58 p ref In GERMAN; ENGLISH summary Report will also be announced as translation (ESA-TT-666)
(DFVLR-Mitt-79-16) Avail: NTIS HC A04/MF A01

The identification of the longitudinal motion of the DFVLR HFB 320 research aircraft using a maximum likelihood method is described. The main emphasis is on the identification of control surface effectiveness of separately or simultaneously deflected DLC flaps and spoilers. The flight test technique and the influence of different model approaches on the results are discussed. E.D.K.

N81-13972# Messerschmitt-Boelkow-Blohm G.m.b.H., Ottobrunn (West Germany). Airplane Div.

ACTIVE FLUTTER SUPPRESSION ON AN F-4F AIRCRAFT WITH EXTERNAL STORES USING ALREADY EXISTING CONTROL SURFACES

O. Sensburg, H. Hoenlinger, and T. E. Moll (AFFDL) 25 Mar. 1980 9 p refs Presented at AIAA 21st Struct., Struct. Dyn. and Mater. Conf., Seattle, 12-14 May, 1980
(MBB-FE-17/S/PUB/24) Avail: NTIS HC A02/MF A01

The flutter suppression system was flight tested using classical flight flutter tests, open loop tests, and closed loop tests. The control law was found by applying optimal control theory thus minimizing the control surface motion due to disturbances and providing the required stability margins. The selection of the wing mounted store configuration is described. T.M.

N81-13973# Messerschmitt-Boelkow-Blohm G.m.b.H., Ottobrunn (West Germany). Airplane Div.

ACTIVE CONTROL OF AN EXPLOSIVE WING-STORE FLUTTER CASE

H. Hoenlinger, O. Sensburg, M. Kuehn, and H. Goedel 8 Apr. 1980 9 p refs Presented at 50th Meeting Struct. and Mater. Panel of AGARD, Athens, 13-18 Apr. 1980
(MBB-FE-17/S/PUB/25) Avail: NTIS HC A02/MF A01

Control laws were calculated, using optimal control theory, to suppress an explosive wing store flutter case on a YF-17 dynamically scaled model. The trailing edge flap was used for flutter suppression because usually hydraulically driven ailerons are available in modern fighters. The design aim of 1.5 times the flutter dynamic pressure could be demonstrated during the wind tunnel test. It should be emphasized that no changes to the analytically developed control law were necessary in the test which proves that theory has well advanced during the last years. E.D.K.

N81-13974# Messerschmitt-Boelkow-Blohm G.m.b.H., Ottobrunn (West Germany). Airplane Div.

EFFECTS OF NONLINEARITIES ON WING STORE FLUTTER

G. DeFerrari, L. Chesta, O. Sensburg, and A. Lotze 9 Apr. 1980 16 p refs Presented at 50th Meeting Struct. and Mater. Panel of AGARD., Athens, 13-18 Apr., 1980 Prepared jointly with Agritalia, Turin
(MBB-FE-17/S/PUB/27) Avail: NTIS HC A02/MF A01

The effects of structural nonlinearities, in particular friction and backlash, on the dynamic behavior of airplanes can be very important for flutter. Larger nonlinearities do exist on sweepable wing airplanes with sweepable wing mounted stores because a considerable amount of joints (with possible play) and bearings (with play and friction) is necessary but the problem is also present for fired wing airplanes. A major problem is the interpretation of linear ground resonance and flight flutter tests and their comparison with analytical predictions. Findings from ground resonance tests and flight flutter tests are presented and an explanation for these test results is given. Calculations with linear assumptions (parameter variations) were made and the method of harmonic balance for finding these parameters was applied. It is shown certain levels of excitation must be reached in order to make flight flutter tests reliable for establishing flutter clearance speeds. Author

N81-13975# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Brunswick (West Germany). Abteilung Flaechenflugzeuge.

THEORETICAL INVESTIGATION OF THE INFLUENCE OF SPOILER DYNAMICS ON THE HANDLING QUALITIES OF AN AIRCRAFT WITH DIRECT LIFT CONTROL

Dieter Schafranek Nov. 1979 72 p refs In GERMAN; ENGLISH summary Report will also be announced as translation (ESA-TT-681)
(DFVLR-FB-80-07) Avail: NTIS HC A04/MF A01; DFVLR, Cologne DM 14,70

Parameters describing the pilots workload during pitch tracking and flight path tracking tasks on a transport aircraft equipped with spoiler direct lift control (DLC) were determined. The

determined parameters are the necessary phase compensation and gain adaption which the pilot must perform and also the closed loop resonance. The influence of DLC gain factor, spoiler actuator rate and spoiler deflection wash-out time constant on pilot workload, is presented. Simulated time histories of pitch rate and normal acceleration response due to step type control inputs show the corresponding reactions of the various DLC configurations which are essential for pitch control and flight path control. Author

N81-13976# Dynamic Controls, Inc., Dayton, Ohio.
RESEARCH AND DEVELOPMENT OF CONTROL ACTUATION SYSTEMS FOR AIRCRAFT. VOLUME 2. THE EVALUATION OF A FORCE SHARING AND AN ACTIVE ON-LINE FLY-BY-WIRE ACTUATION SYSTEM Final Report, Jun. 1977 - Feb. 1979
Gavin D. Jenney 1 Jul. 1980 401 p
(Contract F33615-77-C-3077; AF Proj. 2403)
(AD-A091559; AFFDL-TR-79-3117-Vol-2) Avail: NTIS HC A18/MF A01 CSCL 01/3

This report describes the test evaluation of two Fly-By-Wire development demonstrators submitted to the Air Force for evaluation. The demonstrators were submitted to the Air Force under contract by Grumman Aerospace Corporation, Bethpage, New York. One demonstrator was a force sharing mechanization constructed for Grumman Aircraft by Bertea Corporation of Irvine, California. The other demonstrator was an active-on-line mechanization constructed for Grumman Aerospace Corporation by National Waterlift Corporation of Kalamazoo, Michigan. For the evaluation, the demonstrators were set up with specific performance characteristics which had been used for previous tests performed on other FBW mechanizations. Except where special testing was warranted to investigate potentially unique characteristics of a particular system, the same test procedures were used for both demonstration systems. The report describes the systems evaluated, the test procedures and presents the test results obtained. GRA

09 RESEARCH AND SUPPORT FACILITIES (AIR)

Includes airports, hangars and runways; aircraft repair and overhaul facilities; wind tunnels; shock tube facilities; and engine test blocks.

For related information see also *14 Ground Support Systems and Facilities (Space).*

N81-13977# Calspan Corp., Buffalo, N. Y.
FURTHER INVESTIGATIONS OF ADAPTIVE-WALL WIND TUNNELS Final Report, Aug. 1978 - Dec. 1979
J. C. Erickson, Jr., C. E. Wittliff, and D. C. Daughtery Oct. 1980 72 p refs
(Contract F40600-78-C-0003)
(AD-A091774; CALSPAN-6374-A-1; AEDC-TR-80-34) Avail: NTIS HC A04/MF A01 CSCL 20/4

The objective of this investigation was to continue the assessment of the Calspan perforated-wall, segmented-plenum adaptive-wall wind tunnel for flows in which the tunnel walls are supercritical. An important aspect of the investigation was the development of a static pipe measuring technique for determining the normal velocity distributions. This technique was developed to overcome the limitations on the number of flow angle probe measurements that could be made in the Calspan tunnel. The flow about a static pipe in the presence of model/wall induced disturbances was analyzed within the framework of slender body theory to give the relationship between differential pressure measurements across the pipe and the steam wise derivative of the normal velocity at the pipe centerline. GRA

N81-13978# Effects Technology, Inc., Santa Barbara, Calif.
ROCKET SLED IMPROVED VELOCITY MEASURING SYSTEM FEASIBILITY STUDY Final Report
Walter Naumann, Kristin Engberg, R. Douglas Hogg, and John Hunka 10 Apr. 1980 245 p refs
(Contract F29601-79-C-0041; AF Proj. 9996)
(AD-A091634; ETI-CR80-770) Avail: NTIS HC A11/MF A01 CSCL 14/2

A study has been performed to determine ways to more accurately measure rocket sled velocity. Extreme accuracies of and or - .0003 meter/sec up to 600 meters/sec (0.001 ft/sec up to 2000 ft/sec) are desired in order to adequately test guidance systems. Measurements are desired every millisecond along the 15 kilometer (10 mile) length of the track. After an extensive search, optical interferometers of 2 types were selected for further study. The first of these looks ahead to a sequence of mirrors mounted next to the track. The second looks vertically down at the rail surface and uses fore and aft scattered light from a laser illuminated spot. An improved version of an existing optical beam break system was also selected as a lower performance, lower cost option. Areas of investigation have been the high levels of vibration on the sled, alignment fluctuations due to sled flexing and yaw, and signal to noise ratio including sources, paths and detectors. Other investigations concerned varations in the speed of light, limits of angle resolution and methods of referencing the velocity to a shock mounted guidance package. Experiments are recommended to obtain data on the ambient environments, the sled environment, and several environment controlling and instrumentation techniques.
Dissert. Abstr.

N81-14166*# ARO, Inc., Arnold Air Force Station, Tenn. AEDC Div.
NEW METHODS TO DETECT PARTICLE VELOCITY AND MASS FLUX IN ARC-HEATED ABLATION/EROSION FACILITIES
D. B. Brayton, B. W. Bomar, B. L. Seibel, and P. D. Elrod *In* NASA. Johnson Space Center The 11th Space Simulation Conf. 1980 p 347-377 refs (For primary document see N81-14138 05-31)
Avail: NTIS HC A19/MF A01 CSCL 14B

12 ASTRONAUTICS (GENERAL)

For extraterrestrial exploration see *91 Lunar and Planetary Exploration.*

N81-14957*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
CHEMICAL RELEASE MODULE FACILITY
David L. Reasoner *In its* Space Plasma Phys. Active Expt. Oct. 1980 p 237-246 refs (For primary document see N81-14944 05-99)
Avail: NTIS HC A11/MF A01 CSCL 22A

N81-14958*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
TETHER FACILITY PRESENTATION
P. M. Banks *In its* Space Plasma Phys. Active Expt. Oct. 1980 p 247-258 refs (For primary document see N81-14944 05-99)
Avail: NTIS HC A11/MF A01 CSCL 22A

13 ASTRODYNAMICS

Includes powered and free-flight trajectories; and orbit and launching dynamics.

N81-13979*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
SKYLAB ORBITAL LIFETIME PREDICTION AND DECAY ANALYSIS
P. E. Dreher, R. P. Little, and G. Wittenstein Nov. 1980 117 p refs
(NASA-TM-78308; M-322) Avail: NTIS HC A06/MF A01 CSCL 22A

A record (from preflight planning to Earth impact) of Skylab's orbital lifetime predictions, its actual decay and analysis are presented. Skylab provided a unique opportunity to develop,

confirm and check out procedures and computer programs used for predicting lifetime and reentry. It provided verification of aerodynamic environment which was predicted for several aerodynamic configurations. It also provided data on the density model's reaction to rapidly changing solar flux over relatively short time periods. The effects of solar flux (and the uncertainty in the solar flux predictions) on orbital lifetime are discussed. R.C.T.

N81-13980# Institut fuer Angewandte Geodaesie, Frankfurt am Main (West Germany).
NUMERICAL ASPECTS OF ORBIT COMPUTATION USING SERIES OF KERNEL FUNCTIONS
Hermann Hauck 1979 37 p refs
(Ser-A-89-Mitt-155; ISSN-0071-9196) Avail: NTIS HC A03/MF A01

The perturbation potential of the Earth was interpolated by a series of special kernel functions. The behavior of this interpolation function depends on a free parameter which was determined in order to get a smooth function by application of special smoothness criteria. Orbits of satellites were computed on the basis of kernel functions and of spherical harmonics for the representation of the perturbation potential. A comparison of these orbits shows how the smoothness criteria are to be judged. T.M.

N81-13981# Royal Aircraft Establishment, Farnborough (England).
AN ANALYTICAL GENERATOR FOR DRAG-FREE SATELLITE ORBITS
R. H. Gooding London HMSO Jul. 1980 58 p refs
(RAE-TR-80085; RAE-Space-582; BR76037) Avail: NTIS HC A04/MF A01

The generator incorporates a technique for the rapid computation of lunisolar perturbations, in which simple formulae related to a stationary disturbing body and a uniform ring of mass are combined. Short periodic perturbations, from all sources, are in general neglected; but it was arranged that the value of mean motion derived from the position and velocity vectors input to the generator at epoch was independent of this particular orbital position. The main effects of J2, J2,2, the third-degree harmonics other than J3, lunisolar gravity and solar radiation were represented, so the generator should be suitable for use with any orbit for which the accuracy requirements are compatible with the neglect of atmospheric drag, J3, geopotential harmonics of degree greater than 3 and the effects of the lunar orbit's eccentricity. For a geostationary satellite, the error should not be more than 0.01 deg over a month. T.M.

N81-13982# Riverside Research Inst., New York.
METRIC ACCURACY ANALYSIS Final Report, 1 Oct. 1978 - 30 Sep. 1979
Charles R. Pedersen 15 Oct. 1979 26 p refs
(Contract F19628-78-C-0002)
(AD-A091749; ESD-TR-79-334) Avail: NTIS HC A03/MF A01 CSCL 16/2

During the contract year 1 October 1978 through 30 September 1979 considerable progress was made toward implementing a new Lincoln Orbit Determination (LODE) software capability at MIT Lincoln Laboratory for precise post mission determination of reentry vehicle trajectory and motions during both exo- and endo-atmospheric phases of flight. Early in the year, RRI completed preparation of all equations for the Kaman based forward backward filter smoother algorithm which provides the optimal LODE estimation capability. GRA

14 GROUND SUPPORT SYSTEMS AND FACILITIES (SPACE)

Includes launch complexes, research and production *facilities; ground support equipment, mobile transporters;* and simulators.

For related information see also 09 Research Support *Facilities (Air).*

N81-14148*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
SHUTTLE MISSION SIMULATOR
Charles Olasky *In its* The 11th Space Simulation Conf. 1980 p 113-126 refs (For primary document see N81-14138 05-31)
Avail: NTIS HC A19/MF A01 CSCL 14B

N81-14149*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
A RADIANT HEATING TEST FACILITY FOR SPACE SHUTTLE ORBITER THERMAL PROTECTION SYSTEM CERTIFICATION
William D. Sherborne and James D. Milhoan *In its* The 11th Space Simulation Conf. 1980 p 126-142 refs (For primary document see N81-14138 05-31)
Avail: NTIS HC A19/MF A01 CSCL 14B

N81-14150*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
AN EFFECTIVE COMBINED ENVIRONMENT TEST FACILITY
Allen Deitch *In its* The 11th Space Simulation Conf. 1980 p 143-148 (For primary document see N81-14138 05-31)
Avail: NTIS HC A19/MF A01 CSCL 14B

15 LAUNCH VEHICLES AND SPACE VEHICLES

Includes boosters; manned orbital laboratories; reusable vehicles; and space stations.

N81-13983 Institut d'Aeronomie Spatiale de Belgique, Brussels.
TABLES OF ARTIFICIAL SATELLITES, 1979
J. Vercheval 1980 32 p In FRENCH; ENGLISH summary
(Aeronomica-Acta-F-30-1980) Avail: Issuing Activity

A table of the satellites launched in 1979 is given in alphabetical order, followed by a brief description of the missions for the various types of satellites and the chronology of manned space flight. The list of corrections to the table of satellites 1957-1978 is presented. Author

N81-13984# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany). Inst. fuer Dynamik der Flugsysteme.
SYSTEM TECHNIQUES, SATELLITES, ORBIT DESIGN, THERMAL CONTROL, POWER SUPPLY, ATTITUDE CONTROL, TELEMETRY SYSTEM
Juergen Puls May 1979 164 p refs In GERMAN; ENGLISH summary Report will also be announced as translation (ESA-TT-671)
(DFVLR-FB-79-37) Avail: NTIS HC A08/MF A01; DFVLR, Cologne DM 26,80

A proposal is given for a climate research mission for Earth radiation budget measurements. This requires daily global coverage fulfilled by a system of three orbiting satellites. One of these is on a nonsunsynchronous drift orbit with about 57 deg inclination, represented by the satellite SEOCS. The two others are polar orbiting satellites, called POMS. Appropriate orbits are designed for these and concepts are investigated up to component level in order to demonstrate mission feasibility. E.D.K.

N81-13985# British Aerospace Dynamics Group, Bristol (England).
HANDBOOK OF SATELLITE POINTING ERRORS AND THEIR STATISTICAL TREATMENT
M. C. Weinberger Paris ESA Mar. 1980 90 p *ref*
(Contract ESA-3289/77/NL-AK(SC))
(ESS/SS-997; ESA-CR(P)-1364) Avail: NTIS HC A05/MF A01

This handbook aims to provide both satellite payload and attitude control system designers with a consistent, unambiguous approach to the formulation, definition and interpretation of attitude pointing and measurement specifications. It reviews and assesses the current terminology and practices, and from them

establishes a set of unified terminology, giving the user a sound basis to understand the meaning and implications of various specifications and requirements. Guidelines are presented for defining the characteristics of the error sources influencing satellite pointing and attitude measurement, and their combination in performance verification. A.R.H.

N81-13986# Massachusetts Inst. of Tech., Cambridge. Aerophysics Lab.

***WIND TUNNEL TESTS OF A GERDIEN CAPACITOR VEHICLE COMBINATION* Final Report, 1 Feb. 1979 - 30 Apr. 1980**

Charles W. Haldeman Hanscom AFB, Mass. AFGL May 1980 44 p refs

(Contract F19628-79-C-0059; AF Proj. 2310)

(AD-A091719; MIT-TR-206; AFGL-TR-80-0179) Avail: NTIS HC A03/MF A01 CSCL 04/1

Wind tunnel tests at MIT and AEDC of a rocket borne upper atmospheric probe for measuring atmospheric charge density are reported. The Gerdien capacitor probe consists of a short section of a coaxial capacitor. This is mounted on pylons from a model of the Tomahawk vehicle. Results are reported for the Mach number range 2 to 4 and altitude range 38 to 95 Km and compared with previous data. Over this range the ratio of mass flow through the probe to mass flow in an equal cross section of the free stream ranged from .2 to .80. Reported measurements extend the range of altitude and Mach number for which data is available. Best correlation of mass capture efficiency is obtained as a function of the viscous interaction parameter M times square root of Re. In terms of this parameter capture efficiency exhibits a minimum of .2 at 50; rising to 0.5 at 15 and .8 at 1000. GRA

N81-13987# *ARO, Inc., Arnold Air Force Station, Tenn.*

***HEAT-TRANSFER TESTS ON A FULL AND 1/4 SCALE AIM-9E SIDEWINDER MISSILE AND A 1/15 SCALE GBU-8 GUIDED BOMB UNIT AT MACH NUMBERS 1.5, 2.0 AND 2.5* Final Report, Jun. - Aug. 1979**

W. K. Crain AEDC Oct. 1979 53 p refs Sponsored by the Air Force

(AD-A091805; AEDC-TSR-79-V60) Avail: NTIS HC A04/MF A01 CSCL 16/4

Heat transfer tests were conducted in the Arnold Engineering Development Center (AEDC) Supersonic Wind Tunnel A on a 1/4 and full scale AIM-9E Sidewinder Missile and a 1/15 scale GBU-8 Guided Bomb Unit. The purpose of the tests was to obtain heating distributions on the stores for wind tunnel/flight correlation and as baseline data for input to an analytic thermal response code. Heat transfer coefficient, adiabatic wall temperature, and Schlieren/shadowgraph photographic data were obtained. Tests were conducted at Mach numbers 1.5, 2.0 and 2.5 and free stream unit Reynolds numbers of 1 x 10 to the 6th power to 5 x 10 to the 6th power. Model angle of attack was varied over the range from -2 to 4 degrees. In addition, performance evaluation tests were conducted on a stand alone flight data system designed to gather flight test heat transfer data. GRA

N81-13988# Army Materiel Systems Analysis Activity, Aberdeen *Proving Ground, Md.*

A MONTE CARLO MODEL FOR DETERMINING COPPERHEAD PROBABILITY OF ACQUISITION AND MANEUVER

Michael Starks Aug. 1980 39 p refs

(DA Proj. 1R7-65706-M-541)

(AD-A091587; AMSAA-TR-308) Avail: NTIS HC A03/MF A01 CSCL 16/2

This report documents AMSAA's Probability of Acquisition and Maneuver (PAM) model. The model is used to develop performance estimates for COPPERHEAD and related weapon systems. A mathematical method for modeling the acquisition and maneuver portions of a COPPERHEAD trajectory is presented. In addition, the report contains a FORTRAN implementation of the model, a description of the required inputs, and a sample case with input and output. GRA

N81-13989# *Naval Environmental Prediction Research Facility, Monterey, Calif.*

***DETERMINATION OF THE PRIMARY SPECULAR POINT IN THE SUNGLINT PATTERN OF A POLAR-ORBITING SATELLITE IMAGE* Final Report**

Ted L. Tsui and Robert W. Fett Aug. 1980 30 p ref

(WF52561792)

(AD-A091664; NEPRF-TR-80-03) Avail: *NTIS HC A03/MF A01 CSCL 22/3*

A mathematical procedure for calculating the location of the primary specular point (PSP) in polar orbiting satellite data is described in step-by-step detail. For purposes of this discussion, the PSP is defined as 'that point on the great circle arc perpendicular to the satellite subpoint track passing through the satellite subpoint and the solar subpoint where the angle of incidence of the Sun's rays on a horizontal plane (measured from the local zenith) is equal to the angle of reflection of the Sun's rays to the satellite in space.' The procedure can easily be developed into a small computer program that can be run on a minicomputer or on a programmable calculator. GRA

N81-14139*# *National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.*

COMPREHENSIVE TESTING OF A DEFENSE SYSTEMS COMMUNICATIONS SATELLITE

Neil K. Shirk and Stafford J. Keer *In its* The 11th Space Simulation Conf. 1980 p 1-12 (For primary document see N81-14138 05-31)

Avail: NTIS HC A19/MF A01 CSCL 22B

N81-14141*# General Electric Co., Philadelphia, Pa.

R. F. TESTING OF THE THIRD GENERATION DEFENSE COMMUNICATION SATELLITE

John Sargent and Michael Massaro *In* NASA. Johnson Space Center The 11th Space Simulation Conf. 1980 p 24-32 (For primary document see N81-14138 05-31)

Avail: NTIS HC A19/MF A01 CSCL 22B

16 SPACE TRANSPORTATION

Includes passenger and cargo space transportation e.g., shuttle operations; and rescue techniques.

For related information see also 03 *Air Transportation and Safety* and *85 Urban Technology and Transportation.*

N81-13990*# National Aeronautics and Space Administration. *Marshall Space Flight Center, Huntsville, Ala.*

SPACE SHUTTLE SOLID ROCKET BOOSTER RECOVERY SUBSYSTEM

Roy E. Runkle Jan. 1981 17 p

(NASA-TM-82389) Avail: NTIS HC A02/MF A01 CSCL 22B

The studies, the development, and the testing program that led to the design and delivery of all flight hardware are described. Special emphasis was placed on the recovery parachutes. The parachutes were designed to deploy in a severe environment and safely lower to Earth an 85 ton rocket motor casing. T.M.

N81-14142*# National Aeronautics and Space Administration. *Lyndon B. Johnson Space Center, Houston, Tex.*

PYROTECHNIC SHOCK AT THE ORBITER/EXTERNAL TANK FORWARD ATTACHMENT

William F. Rogers, David S. Grissom, and Larry R. Rhodes In its The 11th Space Simulation Conf. 1980 p 33-42 (For primary document see N81-14138 05-31)

Avail: NTIS HC A19/MF A01 CSCL 22B

N81-14143*# *National Aeronautics and Space Administration.* Lyndon B. Johnson Space Center, Houston, Tex.

THERMODYNAMIC PERFORMANCE TESTING OF THE ORBITER FLASH EVAPORATOR SYSTEM

James R. Jaax, Michael A. Melgares (United Technologies Corp., Houston, Tex.), and James P. Frahm (Rockwell International, Houston, Tex.) *In its* The 11th Space Simulation Conf. 1980 p 43-54 refs (For primary document see N81-14138 05-31)

Avail: NTIS HC A19/MF A01 CSCL 22B

N81-14144*# *National Aeronautics and Space Administration.*
Lyndon B. Johnson Space Center, Houston, Tex.
ORBITER INTEGRATED ACTIVE THERMAL CONTROL SUBSYSTEM TEST
James R. Jaax *In its* The 11th Space Simulation Conf. 1980 *p 55-70 refs (For primary document see N81-14138 05-31)*
Avail: NTIS HC A19/MF A01 CSCL 22B

N81-14153*# *Faraday Labs., Inc., La Jolla, Calif.*
INTERACTIONS OF SURFACES WITH THE SOLAR PLASMA
D. McKeown and C. R. Claysmith *In* NASA. Johnson Space Center The 11th Space Simulation Conf. 1980 P 188 - 200 *refs (For primary document see N81-14138 05-31)*
(Contract N00014-78-C-0373)
Avail: NTIS HC A19/MF A01

N81-14154*# National Aeronautics and Space Administration.
Lyndon B. Johnson Space Center, Houston, Tex.
STS-1 MISSION CONTAMINATION EVALUATION APPROACH
Stephen Jacobs, Horst Ehlers, and Edgar R. Miller (NASA, Marshall Space Flight Center, Hunstville, Ala.) *In its* The 11th Space Simulation Conf. 1980 p 201-215 refs (For primary document see N81-14138 05-31)
Avail: NTIS HC A19/MF A01 CSCL 22B

N81-14155*# National Aeronautics and Space Administration.
Lyndon B. Johnson Space Center, Houston, Tex.
EFFECTS OF THE SHUTTLE ORBITER FUSELAGE AND ELEVON ON THE MOLECULAR DISTRIBUTION OF WATER VAPOR FROM THE FLASH EVAPORATOR SYSTEM
Robert G. Richmond and Robert M. Kelso *In its* The 11th Space Simulation Conf. 1980 p 216-226 refs (For primary document see N81-14138 05-31)
Avail: NTIS HC A19/MF A01 CSCL 22B

N81-14168*# *National Aeronautics and Space Administration.*
Lyndon B. Johnson Space Center, Houston, Tex.
SPACE SHUTTLE ORBITER NOSE CAP AND WING *LEADING EDGE CERTIFICATION TEST PROGRAM*
Murray J. Suppanz (Rockwell International, Downey, Calif.) and *John E. Grimaud In its The 11th Space Simulation Conf.* 1980 p 390-409 (For primary document see N81-14138 05-31)
Avail: NTIS HC A19/MF A01 CSCL 22B

17 *SPACECRAFT* COMMUNICATIONS, COMMAND AND TRACKING

Includes telemetry; space communications networks; astronavigation; and radio blackout.

For related information see also 04 *Aircraft Communications and Navigation* and *32 Communications.*

No abstracts in this category.

18 *SPACECRAFT DESIGN, TESTING* AND PERFORMANCE

Includes spacecraft thermal and environmental control; and attitude control.

For life support systems see 54 Man/System Technology and Life Support. For related information see also *05 Aircraft Design, Testing and Performance* and *39 Structural Mechanics.*

N81-13991*# National Aeronautics and Space Administration.
Marshall Space Flight Center, Huntsville, Ala.
STEERING LAW FOR PARALLEL MOUNTED DOUBLE-GIMBALED CONTROL MOMENT GYROS. REVISION A
H. F. Kennel Jan. 1981 22 p ref
(NASA-TM-82390) Avail: NTIS HC A02/MF A01 CSCL 22B

Mounting of double-gimbaled control moment gyros (CMG's) *of unlimited outer gimbal angle freedom with all their outer* gimbal axes parallel allows drastic simplification of the CMG steering law development hardware. The advantages of the parallel *mounting for the CMG steering law development are such that* a law could be developed which is applicable to any number of CMG's with arbitrary angular momentum. Parallel mounting of the CMG's in conjunction with the steering law can therefore be considered a CMG kit suitable for many missions of differing *momentum requirements. It also means that increasing momentum* demands during the design phase of a space vehicle can be easily met by the addition of one or more CMG's of the original *momentum capacity rather than a redesign to a larger momentum* capacity. Another advantage of the parallel mounting is that the failure of any CMG can be treated like any other, i.e., only one failure mode is possible. The CMG steering law distributes the CMG momentum vectors such that all inner gimbal angles are *equal which reduces the rate requirements on the outer gimbal* axes. The steering law also spreads the outer gimbals which ensures avoidance of singularities internal to the angular *momentum envelope.* Author

N81-13992*# National Aeronautics and Space Administration.
Langley Research Center, Hampton, Va.
FINITE ELEMENT STRUCTURAL MODEL OF A LARGE, THIN, COMPLETELY FREE, FLAT PLATE
Suresh M. Joshi (Vigyan Research Associates, Inc.) and Nelson *J. Groom Sep. 1980 21 p refs*
(NASA-TM-81887) Avail: NTIS HC A02/MF A01 CSCL 22B

A finite element structural model of a 30.48 m x 30.48 m x 2.54 mm completely free aluminum plate is described and modal frequencies and mode shape data for the first 44 modes are presented. An explanation of the procedure for using the data is also presented. The model should prove useful for the *investigation of controller design approaches for large flexible* space structures. Author

N81-14140*# National Aeronautics and Space Administration.
Lyndon B. Johnson Space Center, Houston, Tex.
EFFECTIVENESS OF SPACECRAFT TESTING PROGRAMS
A. Krausz *In its* The 11th Space Simulation Conf. 1980 p 13-23 *ref (For primary document see N81-14138 05-31)*
Avail: NTIS HC A19/MF A01 CSCL 22B

19 SPACECRAFT INSTRUMENTATION

For related information see also *06 Aircraft Instrumentation* and *35 Instrumentation and Photography.*

N81-13993*# Rockwell International Corp., Anaheim, Calif.
BUBBLE MEMORY MODULE Final Report
O. D. Bohning and F. J. Becker Washington Dec. 1980 138 p refs
(Contract NAS1-14174)
(NASA-CR-3380; C80-569/201) *Avail: NTIS* HC A07/MF A01 CSCL 14E

Design, fabrication and test of partially populated prototype recorder using *100 kilobit serial chips is described.* Electrical interface, operating modes, and mechanical design of several module configurations are discussed. Fabrication and test of the module demonstrated the practicality of multiplexing resulting in lower power, weight, and volume. This effort resulted in the completion of a module consisting of a fully engineered printed circuit storage board populated with 5 of 8 possible cells and a wire wrapped electronics board. Interface of the module is 16 bits parallel at a maximum of 1.33 megabits per second data rate on either of two interface buses. Author

20 SPACECRAFT PROPULSION AND POWER

Includes main propulsion systems and components e.g., rocket engines; and spacecraft auxiliary power sources.

For related information see also *07 Aircraft Propulsion*, *28 Propellants and Fuels*, and *44 Energy Production and Conversion*.

N81-13994# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Stuttgart (West Germany). Vorhaben Latentenergiespeicherung.

INVESTIGATIONS AND DEVELOPMENTS ON A HALL-ION-THRUSTER Ph.D. Thesis - Stuttgart Univ.

Friedrich Lindner Sep. 1979 128 p refs In GERMAN; ENGLISH summary Report will also be announced as translation (ESA-TT-682)

(DFVLR-FB-80-09) Avail: NTIS HC A07/MF A01; DFVLR, Cologne DM 20

Working characteristics, electron temperature, potential lines, velocity distribution, thrust, and efficiency were tested. The velocity distribution was nearly ideal. The thruster's acceleration of the ions is not space charged limited and therefore works with higher densities of ions using orthogonal electric and magnetic fields. T.M.

N81-13995# Maxwell Labs., Inc., San Diego, Calif.

DEVELOPMENT OF A HIGH ENERGY DENSITY CAPACITOR FOR PLASMA THRUSTERS Final Report, Jul. 1977 - May 1980

Allen Ramrus Oct. 1980 100 p

(Contract F04611-77-C-0045; AF Proj. 3058)

(AD-A091839; MLR-923; AFRPL-TR-80-35) Avail: NTIS HC A05/MF A01 CSCL 21/2

This report presents the results of a technology program directed towards the development of a long life, high energy density capacitor for application in spacecraft. The capacitor has low inductance (approximately 20 nH) and an energy density up to 40 J/lb. Voltage vs. life curves are shown which indicate this capacitor will withstand over 10 to the 7th power discharges when operated at rated voltage of 2.2 kV. Materials were employed in this capacitor which should render it resistant to damage from radiation. To attain radiation resistance and high energy density, kraft tissue was successfully excluded from the winding which is composed principally of K-F polymer and aluminum foil. Various impregnants were tested and the most successful was silicone oil. GRA

N81-14157*# Boeing Aerospace Co., Seattle, Wash.

IUS SOLID ROCKET MOTOR CONTAMINATION PREDICTION METHODS

C. R. Mullen and J. H. Kearnes *In* NASA. Johnson Space Center The 11th Space Simulation Conf. 1980 p 243-256 refs (For primary document see N81-14138 05-31)

Avail: NTIS HC A19/MF A01 CSCL 21H

N81-14158*# Berkeley Industries, Laguna Beach, Calif.

PERFORMANCE OF A FLIGHT QUALIFIED, THERMOELECTRICALLY TEMPERATURE CONTROLLED QCM SENSOR WITH POWER SUPPLY, THERMAL CONTROLLER AND SIGNAL PROCESSOR

Donald A. Wallace *In* NASA. Johnson Space Center The 11th Space Simulation Conf. 1980 p 257-268 refs (For primary document see N81-14138 05-31)

Avail: NTIS HC A19/MF A01 CSCL 21C

23 CHEMISTRY AND MATERIALS (GENERAL)

Includes biochemistry and organic chemistry.

N81-13996# Vacuumschmelze G.m.b.H., Hanau (West Germany).

DEVELOPMENT OF SOFT MAGNETIC MATERIALS WITH SPECIAL PROPERTIES Final Report

Albrecht Mager Bonn Bundesmin. fuer Forsch. u. Technol. Oct. 1979 167 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie

(BMFT-FB-T-79-32; ISSN-0340-7608) Avail: NTIS HC A08/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 34.65

Results on the influence of crystal grains, inclusions, and mechanical stresses on the soft magnetic properties of Ni-Fe-alloys with 50 to 75 percent Nickel contents are given. Special soft magnetic alloys were developed and improved for low temperature applications, for small temperature coefficients, for different shapes for small temperature coefficients, for different shapes of hysteresis loops, and for high wear resistance. Other applications include forms, components, and basic designs of chokes for RFI suppression, transformers for electronic power supplies, transformers for ground fault interrupters, and magnetic shielding equipment. Author

N81-13997# Princeton Univ., N. J. Dept. of Chemistry.

THE MOLYBDENUM-MOLYBDENUM TRIPLE BOND. 9: BIS(1, 3-di-p-TOLYLRIAZENIDO) BIS(DIMENTHYLAMIDO) DIMETHYLDIMOLYBDENUM

Malcoln H. Chisholm, D. A. Haitko, J. Huffman, and K. Folting 31 Oct. 1980 22 p refs Submitted for publication

(Contract N00014-76-C-0826)

(AD-A091550; TR-80-5) Avail: NTIS HC A02/MF A01 CSCL 07/2

1,2-Mo2Me2(NMe2)4 reacts in hydrocarbon solvents with 1,3-di-p-tolyl-triazine, C7H8NNNHC7H8, to give the title compound as a red crystalline solid. An X-ray study shows that in the solid state, the molecule has a crystallographically imposed C2 axis of symmetry. The Mo-Mo bond. 2.174(1) angstroms, is bridged by a cis-pair of triazenido ligands which afford sufficient flexibility to allow a non-eclipsed geometry. Each molybdenum atom is coordinated to three nitrogen atoms and one carbon atom which roughly lie in a plane. Pertinent bond distances are Mo-C (methyl) - 2.193(4) angstroms, Mo-N (dimethylamido) - 1.948(3) angstroms, Mo-N (triazinido) - 2.157(3) and 2.283(3) angstroms, with the longer distance associated with the Mo-N bond which is trans to the Mo-CH3 bond. These observations are compared with other findings in dimolybdenum and ditungsten chemistry (M-M). Crystal data for Mo2Me2(NMe2)2-(C7H8N3C7H8)2 are a - 21.608(5) angstroms, b - 9.440(2) angstroms, c - 24.-76(6) angstroms, - 135.49(1), V - 3442.5(1) angstroms 3, Z 4, dcalcd - 1.464 g/centimeters to the minus 3 and space group C2/c. GRA

N81-13998# Brookhaven National Lab., Upton, N. Y.

PROBLEM OF PHASE TRANSITIONS IN NUCLEAR STRUCTURE

G. Scharff-Goldhaber 1980 9 p refs Presented at the Intern. Conf. on Interacting Bose-Fermi Systems in Nuclei, Erice, Sicily, Italy, 12-19 Jun. 1980

(Contract DE-AC02-76CH-00016)

(BNL-28357; CONF-8006127-1) Avail: NTIS HC A02/MF A01

Phase transitions between rotational and vibrational nuclei are discussed from the point of view of the variable moment of inertia model. A three dimensional plot of the ground state moments of inertia of even-even nuclei vs N and Z is shown. DOE

24 COMPOSITE MATERIALS

Includes laminates.

N81-13999* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

STRUCTURAL WOOD PANELS WITH IMPROVED FIRE RESISTANCE Patent

Paul M. Sawko, Inventor (to NASA) Issued 24 Jun. 1980 4 p Filed 28 Jul. 1978 Supersedes N78-28178 (16-19, p 2498)

(NASA-Case-ARC-11174-1; US-Patent-4,209,561; US-Patent-Appl-SN-929086; US-Patent-Class-428-114; US-Patent-Class-260-17.2; US-Patent-Class-428-528;

US-Patent-Class-428-541; US-Patent-Class-428-921) Avail: US Patent and Trademark Office CSCL 11L

Structural wood paneling or other molded wood compositions consisting of finely divided wood chips, flour, or strands are bound together and hot pressed with a modified novolac resin which is the cured product of a prepolymer made from an aralkyl ether or halide with a phenol and a hardening agent such as hexamethylene tetramine. The fire resistance of these articles is further improved by incorporating in the binder certain inorganic fillers, especially a mixture of ammonium oxalate and ammonium phosphate.

Official Gazette of the U.S. Patent and Trademark Office

N81-14000* National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

PARTIAL INTERLAMINAR SEPARATION SYSTEM FOR COMPOSITES Patent

Wolf Elber, inventor (to NASA) Issued 21 Oct. 1980 5 p Filed 24 Mar. 1978 Supersedes N78-22162 (16-13, p 1675) (NASA-Case-LAR-12065-1; US-Patent-4,229,473; US-Patent-Appl-SN-889671; US-Patent-Class-428-113; US-Patent-Class-156-330; US-Patent-Class-428-114; US-Patent-Class-428-140; US-Patent-Class-428-413; US-Patent-Class-428-480; US-Patent-Class-428-902) Avail: US Patent and Trademark Office CSCL 11D

This inventor relates to an interlaminar separation system for composites wherein a thin layer of a perforated foil film is interposed between adjacent laminae of a composite formed from prepreg tapes to thereby permit laminate adherence through the perforations and produce a composite structure having improved physical property characteristics.

Official Gazette of the U.S. Patent and Trademark Office

N81-14001*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

EFFECTS OF TEMPERATURE, THERMAL EXPOSURE, AND FATIGUE ON AN ALUMINA/ALUMINUM COMPOSITE

George C. Olsen Dec. 1980 35 p refs (NASA-TP-1795; L-14074) Avail: NTIS HC A03/MF A01 CSCL 11D

An experimental investigation of the mechanical properties and microstructure of an aluminum matrix/polycrystalline alumina fiber composite material is discussed. The effects of fabrication, isothermal exposure (up to 10,000 hours at 590 K), thermal cycling (6000 cycles between 200 K and 590 K), fatigue (1,000,000 tension-tension cycles) were determined by mechanical testing and metallurgical analysis. The fabrication process severely degraded the fiber strength by reducing the alumina to a nonstoichiometric form and quenching in the resultant vacancies and stress fields. However, isothermal exposure, thermal cycling, and fatigue cycling all restored the fiber strength by enhancing vacancy annihilation. Comparison of the as-fabricated material with other aerospace materials shows that it is an attractive candidate for select applications. Long duration isothermal exposure weakened the matrix by overaging and through the diffusional loss of lithium to a surface reaction forming lithium carbonate. Thermal cycling initiated cracks in the matrix and fibers. Tension-tension fatigue cycling caused no apparent damage to the as-fabricated material but in fact, strengthened it to the rule-of-mixtures value. Fatigue cycling after thermal exposure did have a cumulative damage effect. M.G.

N81-14002*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

REVIEW AND DEVELOPMENTS OF DISSEMINATION MODELS FOR AIRBORNE CARBON FIBERS

Wolf Elber Nov. 1980 55 p refs (NASA-TM-80216) Avail: NTIS HC A04/MF A01 CSCL 11D

Dissemination prediction models were reviewed to determine their applicability to a risk assessment for airborne carbon fibers. The review showed that the Gaussian prediction models using partial reflection at the ground agreed very closely with a more elaborate diffusion analysis developed for the study. For distances beyond 10,000 m the Gaussian models predicted a slower fall-off in exposure levels than the diffusion models. This resulting level of conservatism was preferred for the carbon fiber risk assessment. The results also showed that the perfect vertical-mixing models developed herein agreed very closely with the diffusion analysis for all except the most stable atmospheric conditions. Author

N81-14003# Royal Aircraft Establishment, Farnborough (England).

LITERATURE RESEARCH ON THE MECHANICAL PROPERTIES OF FIBRE COMPOSITE MATERIALS. ANALYSIS OF THE STATE OF THE ART, VOLUME 1

J. J. Gerharz and D. Schuetz Aug. 1980 388 p refs Transl. into ENGLISH of "Schrifttumsrecherche zum Festigkeitsverhalten von Faserverbundwerkstoffen. Analyse des Standes der Technik' vol. 1, Rept. TB-14-5 Fraunhofer Inst. fuer Betriebsfestigkeit LBF, Darmstadt, West Germany, Jul. 1979 (RAE-LIB-Trans-2045; BR76376; TB-145) Avail: NTIS HC A17/MF A01

The structural use of fiber composite materials is considered with emphasis on the aerospace application of resin matrix materials with fibres of carbon, glass, boron and Kevlar. Aspects covered include (1) mechanical properties, (2) physical observations of damage development in different structural situations; and (3) available methods of damage detection and measurement. The application of fracture mechanics to damage growth and residual strength; methods of stress analysis for loading and environment and prediction of failure; structural design procedures for static and fatigue strength; and inspection methods for ensuring quality in production and safety in service are also considered. Test techniques and methods for determining mechanical behavior of coupons, components and structures are discussed as well as the absorption of moisture and its effect on mechanical properties. The field of structural applications which exploit composite properties is surveyed, economic factors and construction methodology are examined and recommendations on the further development of fibres and matrices and on future research are included. Author

N81-14004# Rolls-Royce Ltd., Derby (England). Plastics and Composite Materials Lab.

A RESIN INJECTION TECHNIQUE FOR THE FABRICATION OF AERO ENGINE COMPOSITE COMPONENTS

W. R. Jones and J. W. Johnson 1980 10 p (PNR-90024) Avail: NTIS HC A02/MF A01

A method for the manufacture of high quality composite aero engine components, free from voids and having a high degree of dimensional reproducibility is described. A porous fiber preform held in the component shape by the use of a thermoplastic binder is employed. The preform is then infiltrated with epoxy resin in a closed die using a vacuum assisted high pressure injection method. It is possible to include inserts or third dimension reinforcement in components, and reference is made to the production of a carbon fiber fan blade and a nose spinner. S.F.

N81-14005# Fiat Research Center, Orbassano (Italy).

MECHANICAL CHARACTERIZATION OF Si3N4

E. Campo and G. Ronchiato 1980 13 p refs Avail: NTIS HC A02/MF A01

The high temperature mechanical behaviour was determined for two ceramic materials, produced by pressureless sintering based on the systems Si3N4 - MgO - Fe and Si3N4 - Y2O3 - MgO. The characterization was carried out applying fracture mechanics concepts. The following measurements were performed: (1) fracture toughness; (2) statistical fracture strength; and (3) slow crack propagation rate. Results are discussed with reference to the materials capability and to the understanding of relationship between materials structure and mechanical behavior Author

N81-14006# Messerschmitt-Boelkow-Blohm G.m.b.H., Ottobrunn (West Germany). Aircraft Div.

CONSTANT-AMPLITUDE AND FLIGHT-BY-FLIGHT TESTS ON CERP SPECIMENS

F. J. Arendts, K. O. Sippel, and D. Weisgerber 9 Apr. 1980 13 p refs Presented at 50th Meeting Struct. and Mater. Panel of AGARD, Athens, 13-18 Apr., 1980 Supported by FRG Min. of Defense (MBB-FE-2/S/PUB-26) Avail: NTIS HC A02/MF 01

Constant-amplitude and flight-by-flight tests with five different load spectra were done with unnotched carbon fiber reinforced points specimens. Also the influence of overloads was investigated.

The test results were compared with fatigue life predictions based on 'Miner's Rule' applied for different conditions. The results show that overloads in all cases cause a significant reduction of the fatigue life. It turned out that fatigue life estimations based on 'Miner's Rule' are on the unsafe side in some cases by more than a factor 10, getting a big scatter among the cases investigated. Author

N81-14007# Royal Aircraft Establishment, Farnborough (England).
AN X-RAY PHOTOELECTRON SPECTROSCOPIC EXAMINATION OF SURFACES OF SOME THERMOSETTING RESINS AND CARBON FIBRE COMPOSITES
Brenda M. Parker London HMSO Jun. 1980 32 p refs
(RAE-TM-MAT-347; BR75399) Avail: NTIS HC A03/MF A01

The surfaces of a range of cast thermosetting resins and carbon fibre composities were investigated by electron spectroscopy for chemical analysis. The peaks recorded were assymmetrical and could be resolved to give minor peaks which were related to the chemical groups present in the resins. In particular, peaks due to the CF2 were deconvoluted from the carbon 1s and flourine 1s peaks and related quantitatively. These groups arose from contamination of the resin and composite surfaces by polymeric fluorinated hydrocarbon release agents. Surface contamination was reduced to a low level by abrasion. Oxidative chemical treatment of composite surfaces caused an increase in the amount of oxygen bonded to carbon. R.C.T.

N81-14008# General Electric Co., Schenectady, N. Y. Corporate Research and Development Center.
DEVELOPMENT OF HIGH PERFORMANCE SINTERED Si3N4 Final Technical Report, Sep. 1978 - Apr. 1980
C. D. Greskovich and J. A. Palm Sep. 1980 95 p refs
(Contracts DAAG46-78-C-0058; EC-76-A-1017-002)
(AD-A091757; SRD-80-111; AMMRC-TR-80-46) Avail: NTIS HC A05/MF A01 CSCL 07/2

A gas pressure sintering (GPS) process has been developed to produce Si3N4, containing 0.5-1.0 wt% Be and 2.5-3.7 wt% O, with = 99% relative density. The modulus of rupture of GPS Si3N4 at 1300 degrees was 553 MNm to the minus 2 power (80,200 psi), representing 93% of its room temperature strength. The creep and oxidation resistances were outstanding and evidenced by creep rates of 4.6 x 10 to the minus 7 power and 6.9 x 10 to the minus 6 power N to the minus 1 power at a stress of 69 MNm to the minus 2 power (10,000 psi) at 1300 and 1400 C in air. GRA

N81-14009# Massachusetts Inst. of Tech., Cambridge. Center for Materials Science and Engineering.
ELECTRONIC AND OPTICAL PROPERTIES AND MODELING OF INTERCALATED GRAPHITE Final Report, 15 Jul. 1977 - 14 Oct. 1980
M. S. Dresselhaus and G. Dresselhaus 30 Sep. 1980 99 p refs
(Grant AF-AFOSR-3391-77; AF Proj. 2306)
(AD-A091858; AFOSR-80-1065TR) Avail: NTIS HC A05/MF A01 CSCL 07/4

Under this grant a study was carried out of the electronic and optical properties and modeling of intercalated graphite. A major contribution of this work has been the formulation of a model for the electronic structure, applicable to compounds of arbitrary stage and intercalant. The results of this model have been applied to the interpretation of Fermi surface and magnetoreflection measurements also carried out under this grant. These measurements thus provide detailed information on the effect of intercalation on the electronic structure and on the Fermi surfaces of intercalated graphite. Results on infrared spectroscopy of intercalated graphite provide information on the lattice mode structure, complementing the findings on the electronic structure. The use of Raman spectroscopy to study adsorbed species on graphite surfaces is demonstrated. GRA

N81-14010# Corps of Engineers, Champaign, Ill.
INVESTIGATION OF THE MINIMUM DEPLOYMENT TIME OF A FOAM/FABRIC COMPOSITE MATERIAL Final Report
Alvin Smith, B. R. Culbertson, and R. E. Muncy Sep. 1980 42 p refs
(AFOSR MIPR-1456-79)
(AD-A091658; CERL-TR-M-281) Avail: NTIS HC A03/MF A01 CSCL 11/4

This report describes the formulation, test design, materials, and evaluation of a very fast operating polystyrene foam generating system. It was established that low boiling point solvents can be used to dissolve the polymer and act as the means of (1) providing gas pressure for discharging the material from a pressure vessel and (2) foaming the polymer within a cylindrical fabric sleeve. The discharge time was related to initial internal pressure. The minimum deployment time for a 0.5 x 10 ft (0.15 x 3.05-m) cylinder was found to be about 50 milliseconds. GRA

N81-14011# Rensselaer Polytechnic Inst., Troy, N. Y. Dept. of Mechanical Engineering, Aeronautical Engineering and Mechanics.
ON ONE-DIMENSIONAL ACCELERATION WAVES IN COMPOSITE MATERIALS MODELED AS INTERPENETRATING SOLID CONTINUA
M. F. McCarthy and H. F. Tiersten Oct. 1980 38 p refs
(Contract N00014-76-C-0368; NR Proj. 318-009)
(AD-A091615; TR-32) Avail: NTIS HC A03/MF A01 CSCL 11/4

A one-dimensional version of a theory of composite materials modeled as interpenetrating solid continua is applied in the analysis of acceleration waves in composites containing two identifiable constituents. As expected, two distinct acceleration waves always propagate except when one of the constituents consists of a chopped fiber. The influence of viscous type damping is included in only the volumetric interaction between the constituents in portions of the treatment. Equations are derived both for the propagation velocities and the varying amplitudes of the disturbance as a function of the state of the material immediately ahead of the wavefront. These rather general results are specialized to the case of a homogeneous steady-state ahead of the fast wave. The various types of behavior possible and the order of the discontinuities occurring across the wavefront are discussed in detail for a number of special cases. GRA

N81-14012# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
UNIDIRECTIONAL COMPOSITES AS ELECTRODES/PREIONIZATION SOURCES FOR CO2 TEA LASERS Ph.D. Thesis - Georgia Inst. of Tech.
Steven Gary Wax Dec. 1979 223 p refs
(AD-A091407; AFIT-CI-79-249D) Avail: NTIS HC A10/MF A01 CSCL 20/5

Transverse Excited Atmospheric (TEA) CO2 lasers offer improvements over low pressure CO2 lasers, but efficient operation at atmospheric pressure is often difficult to achieve. The purpose of this research was to examine the feasibility of using unidirectional oxide metal composites grown at the Georgia Institute of Technology to obviate the problems of high pressure CO2 laser operation. The research was divided into two areas. In the first, Gd2O3-Ce2O3-Mo and UO2-W composites were examined for use directly as electrodes in CO2 lasers. Using discharge apparatus similar to that used for CO2 lasers, the discharge characteristics from polished and exposed pin composite electrodes were examined. The results of the cathode fall tests indicated that cathode fall for every composite electrode tested was higher than for the aluminum standard. No significant advantage with the composite electrodes at high pressure was observed. In the second phase of the research, low voltage field emitters (LVFE) were examined as a preionization source for the discharge. These emitters were prepared using thin film techniques from the UO2-W composites. In this phase, field emission at atmospheric pressure, the control of a discharge by field emission and the survivability of the LVFE structure at high pressure were all considered. GRA

N81-14013# Sandia Labs., Albuquerque, N. Mex. Aerothermodynamics Div.
THERMAL ANALYSIS OF PROPOSED W81 HEATSHIELD MATERIALS FLOWN ON A MALEMUTE SYSTEM
Sam C. Beard, Irving Auerbach, Robert E. Sheldahl, and Don E. Larson Jul. 1980 86 p refs Sponsored by DOE
(SAND-79-2417) Avail: NTIS HC A05/MF A01

A program to select heat shield materials for the W81 nuclear

ordnance section of the Navy Standard Missile-2 included analytical studies, laboratory and wind tunnel tests, and flight tests. A flight test was conducted on April 19, 1979, at the Tonopah Test Range where a materials test section was flown on a Malemute rocket; the test section was recovered by parachute. The six test materials were Avcoat 8021, Flamemaster DE-370 and E-400, Rogers Duroid 5880, Raychem SRA, and Dow Corning 3145. Heat transfer rates and aluminum structure temperatures were measured. Good agreements between the measured and computed values were obtained in the postflight analysis. Results indicate that only Avcoat 8021 and Duroid 5880 are suitable heat shield materials for the W81. Author

N81-14014# Bendix Corp., Kansas City, Mo.
EXPERIMENTAL MODELING OF LAMINAR COMPOSITES FOR MULTIFREQUENCY EDDY CURRENT MEASUREMENTS
R. V. Heckman Aug. 1980 45 p refs
(Contract DE-AC04-76DP-00613)
(BDX-613-2482) Avail: NTIS HC A03/MF A01

A computer program capable of calculating the experimental voltage amplitudes and phases which can be obtained with rectangular cross section coils being operated at multiple frequencies was applied to two multilayered composites in order to determine the feasibility of making thickness and resistivity measurements of the individual layers. The results of these calculations indicate that the thickness of the aluminum/Kapton composite layers could be measured to a precision of better than 1% and the resistivity of the conductive layers could be measured to a precision of better than 10%. The second composite, a structure consisting of alternating layers of aluminum and polyimide, a varnish, was found to be measureable also. A minimum of two frequency components was found to be necessary for the aluminum/Kapton composite while three frequencies were found to be necessary for the aluminum polyimide case. DOE

N81-14169*# Aerospace Corp., El Segundo, Calif.
HEATSHIELD MATERIAL SELECTION FOR ADVANCED BALLISTIC REENTRY VEHICLES
P. J. Legendre, T. Holtz, and J. C. Sikra (Air Force Ballistic Missile Office, Norton AFB, Calif.) *In its* The 11th Space Simulation Conf. 1980 p 410-426 refs (For primary document see N81-14138 05-31)
Avail: NTIS HC A19/MF A01 CSCL 11D

25 INORGANIC AND PHYSICAL CHEMISTRY

Includes chemical analysis, e.g., chromatography; combustion theory; electrochemistry; and photochemistry.

For related information see also *77 Thermodynamics and Statistical Physics*.

N81-14015* National Aeronautics and Space Administration. Pasadena Office, Calif.
STARK CELL OPTOACOUSTIC DETECTION OF CONSTITUENT GASES IN SAMPLE Patent
Jack S. Margolis (JPL) and Michael S. Shumate, inventors (to NASA) (JPL) Issued 18 Nov. 1980 7 p Filed 31 Aug. 1978 Supersedes N79-10169 (17-01, p 0023) Sponsored by NASA
(NASA-Case-NPO-14143-1; US-Patent-4,234,258;
US-Patent-Appl-SN-938297; US-Patent-Class-356-437;
US-Patent-Class-250-343) Avail: US Patent and Trademark Office CSCL 07D

An optoacoustic detector for gas analysis is implemented with Stark effect cell modulation for switching a beam in and out of coincidence with a spectral line of a constituent gas in order to eliminate the heating effect of laser energy in the cell as a source of background noise. By using a multiline laser, and linearly sweeping the dc bias voltage while exciting the cell with a multiline laser, it is possible to obtain a spectrum from which to determine the combinations of excited constituents and determine their concentrations in parts per million.
Official Gazette of the U.S. Patent and Trademark Office

N81-14016* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
PERFLUOROALKYL POLYTRIAZINES CONTAINING PENDENT IODODIFLUOROMETHYL GROUPS Patent
Robert W. Rosser (PCR, Inc., Gainesville, Fla.) and Theodore Psarras, inventors (to NASA) (PCR, Inc., Gainesville, Fla.) Issued 18 Nov. 1980 5 p Filed 8 May 1979 Supersedes N79-24153 (17 - 15, p 1960) Sponsored by NASA
(NASA-Case-ARC-11241-1; US-Patent-4,234,715;
US-Patent-Appl-SN-037066; US-Patent-Class-528-362;
US-Patent-Class-260-33.8F; US-Patent-Class-528-401;
US-Patent-Class-528-422) Avail: US Patent and Trademark Office CSCL 07D

New perfluoroalkyl polytriazines containing pendent iododifluoromethyl groups are prepared by the reaction of perfluoroalkyl dinitriles with ammonia to form poly(imidoylamidines), followed by the cyclization of the imidoylamidine groups with, e.g., various mixtures of a perfluoroacyl fluoride with an omega iodoperfluoroacyl fluoride. The polytriazines obtained can be cured by heat which causes crosslinking at the iododifluoromethyl groups by elimination of iodine and formation of carbon-to-carbon bonds.
Official Gazette of the U.S. Patent and Trademark Office

N81-14017*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
CHEMICAL KINETIC MODELS FOR COMBUSTION OF HYDROCARBONS AND FORMATION OF NITRIC OXIDE
Casimir J. Jachimowski and Charles H. Wilson Dec. 1980 32 p refs
(NASA-TP-1794; L-14106) Avail: NTIS HC A03/MF A01 CSCL 21B

The formation of nitrogen oxides NOx during combustion of methane, propane, and a jet fuel, JP-4, was investigated in a jet stirred combustor. The results of the experiments were interpreted using reaction models in which the nitric oxide (NO) forming reactions were coupled to the appropriate hydrocarbon combustion reaction mechanisms. Comparison between the experimental data and the model predictions reveals that the CH + N2 reaction process has a significant effect on NO formation especially in stoichiometric and fuel rich mixtures. Reaction models were assembled that predicted nitric oxide levels that were in reasonable agreement with the jet stirred combustor data and with data obtained from a high pressure (5.9 atm (0.6 MPa)), prevaporized, premixed, flame tube type combustor. The results also suggested that the behavior of hydrocarbon mixtures, like JP-4, may not be significantly different from that of pure hydrocarbons. Application of the propane combustion and nitric oxide formation model to the analysis of NOx emission data reported for various aircraft gas turbines showed the contribution of the various nitric oxide forming processes to the total NOx formed. Author

N81-14018*# Lockheed Engineering and Management Services Co., Inc., Houston, Tex. Planetary and Earth Sciences Dept.
ELECTRON MICROPROBE MINERAL ANALYSIS GUIDE
Roy W. Brown Sep. 1980 187 p
(Contract NAS9-15800)
(NASA-CR-160895) Avail: NTIS HC A09/MF A01 CSCL 07D

Electron microprobe mineral analysis guide is a compilation of X-ray tables and spectra recorded from various mineral matrices. Spectra were obtained using electron microprobe, equipped with LiF geared, curved crystal X-ray spectrometers, utilizing typical analytical operating conditions: 15 Kv acceleration potential, 0.02 microampere sample current as measured on a clinopyroxene standard (CP19). Tables and spectra are presented for the majority of elements, fluorine through uranium, occurring in mineral samples from lunar, meteoritic and terrestrial sources. Tables for each element contain relevant analytical information, i.e., analyzing crystal, X-ray peak, background and relative intensity information, X-ray interferences and a section containing notes on the measurement. Originally intended to cover silicates and oxide minerals the tables and spectra have been expanded to cover other mineral phases. Electron microprobe mineral analysis guide is intended as a spectral base to which additional spectra

can be added as the analyst encounters new mineral matrices. R.C.T.

N81-14019# Fiat Research Center, Turin (Italy).
SOME RESULTS ON MEASUREMENT OF TEMPERATURE AND DENSITY IN A FLAME BY RAMAN SPECTROSCOPY
G. Alessandretti 1980 13 p refs Submitted for publication
Avail: NTIS HC A02/MF A01

Temperature and molecular concentration profiles in a premixed laminar flame, generated by a multihole burner, were investigated by spontaneous Raman spectroscopy. Experimental data obtained using a chopped Ar ion laser beam as a source are presented. Analyses of the observed N2 vibrorotational spectra for the determination of temperature in the reaction and post reaction zone of the flame are discussed. Concentration of the various species are obtained from the corresponding spectra and the measured temperature. Results show that this method provides satisfactory space resolution and good reliability. Author

N81-14020# National Physical Lab., Teddington (England). Div. of Chemical Standards.
AN AUTOMATIC METHOD FOR CHECKING THE INTERNAL CONSISTENCY OF ACTIVITY COEFFICIENTS OF BINARY MIXTURES
J. F. Counsell and C. P. Hicks Feb. 1980 13 p refs
(NPL-CHEM-104; ISSN-0143-7003) Avail: NTIS HC A02/MF A01

An automatic method for checking the internal consistency of vapor liquid equilibrium data for binary mixtures where vapor compositions are measured and activity coefficients calculable is described. The method is applicable, once programmed, for a computer and provides a limited amount of output on which data consistency decisions can be made. The main core of the program consisting of deeply nested loops, is given in its BASIC version. Author

N81-14021# National Physical Lab., Teddington (England). Div. of Chemical Standards.
VAPOR-LIQUID CRITICAL PROPERTIES
D. Ambrose Feb. 1980 63 p refs
(NPL-CHEM-107; ISSN-0143-7003) Avail: NTIS HC A04/MF A01

Compiled data on vapor liquid thermophysical properties of pure liquids and a few well defined mixtures are presented. All data are presented in the form of tables. R.C.T.

N81-14022# Institut fuer Angewandte Festkoerperphysik der Fraunhofer Gesellschaft e.V., Freiburg im Breisgau (West Germany).
INVESTIGATION OF ELECTROCHROMIC EFFECTS FOR DISPLAY APPLICATION Final Report
Volker Wittwer, Ortwin F. Schirmer, Peter Schlotter, Christa Vogel, and Roland Diehl Bonn Bundesministerium fuer Forschung und Technologie Nov. 1979 78 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-79-42; ISSN-0340-7608) Avail: NTIS HC A05/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 15,95

The electrochromic effect in transition metal oxides is a useful principle for application in passive displays. High background brightness, contrast not sensitive to viewing angle, high spatial resolution and inherent storage effects can be expected. The technological realization, demands a classification of the physical fundamentals, which are unknown. Basic features of the electrochromic process are elucidated; e.g., the nature of the optical absorption and the electronic transport mechanism. First steps towards the realization of displays are described. S.F.

N81-14023# Siemens A.G., Munich (West Germany).
PHYSICAL AND CHEMICAL PROCESSES FOR THE GENERATION OF 1 MICRON STRUCTURES Final Report
Leonard Mader Bonn Bundesministerium fuer Forschung und Technologie Nov. 1979 61 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-79-51; ISSN-0340-7608) Avail: NTIS HC A04/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 12,40

The following processes for the realization of fine structures in isolator and metal layers on silicon wafers were studied: wet chemical etching of silicon dioxide and aluminum layers; plasma etching of polysilicon layers; ion beam etching of silicon dioxide and polysilicon layers; lift off technique for metal pattern generation. S.F.

N81-14024# National Physical Lab., Teddington (England). Div. of Electrical Science.
THE USE OF APPROXIMATE EXPRESSIONS IN POWER TRANSMISSION SPECTROMETRY
J. R. Birch Apr. 1980 17 p refs
(NPL-DES-64; ISSN-0143-7305) Avail: NTIS HC A02/MF A01

The systematic errors in the calculated value of the power absorption coefficient that result from the use of three approximate expressions relating the coefficient to the measured power transmission of a specimen are examined. The conditions under which significantly large systematic errors can occur are outlined, allowing the experimentalist to judge which expression is most applicable to a particular experiment. Author

N81-14025# National Physical Lab., Teddington (England). Div. of Numerical Analysis and Computer Science.
NUMERICAL SOLUTION OF AN ADVECTION-DIFFUSION EQUATION FOR A DISSOLVED SPECIES IN A PULSATING CRACK
D. H. Ferriss Apr. 1980 28 p refs
(NPL-DNACS-28/80; ISSN-0143-7348) Avail: NTIS HC A03/MF A01

Numerical methods are used to obtain a solution to a partial differential equation representing the mass transport of a dissolved species in a slowly pulsating crack. A standard finite difference scheme is found to be inadequate for this problem in that it produces severe spatial oscillations in the solution, whereas an alternative discretization involving the species flux proves to be successful. The failure of the standard technique is shown to be due to the dominance of the advection mechanism. When diffusion is ignored, the method of characteristics can be employed to obtain an analytic solution which is similar in many respects to the numerical solution of the original problem. Author

N81-14026# National Physical Lab., Teddington (England). Div. of Quantum Metrology.
SPECTROSCOPIC INVESTIGATIONS AND DETERMINATION OF THE TEMPERATURE DISTRIBUTION IN A METAL HALIDE DISCHARGE LAMP
A. J. Davenport and K. C. Lapworth Apr. 1980 98 p refs
(NPL-QU-54; ISSN-0309-3050) Avail: NTIS HC A05/MF A01

A spectroscopic investigation of a scandium halide discharge lamp was carried out, with special attention given to developing suitable techniques for determining the temperature distribution throughout the discharge. A commercial lamp was used, and future investigations would be greatly improved by using specially constructed lamps equipped with a quartz discharge tube of high optical quality and possibly an outer envelope fitted with a flat window of good optical quality. Other possible future directions in this research are also suggested. L.F.M.

N81-14027# Technische Hogeschool, Delft (Netherlands). Lab. voor Apparatenbouw Procesindustrie.
AGGLOMERATION IN SUSPENSION: A STUDY OF MECHANISMS AND KINETICS
G. G. Bemer Oct. 1979 89 p refs
(WTHD-120) Avail: NTIS HC A05/MF A01

Growth kinetics and mechanisms of batch agglomerations in suspension were studied. A light backscatter method was developed, which enabled the increase of an average particle size from 1-50000 micrometers to be followed in situ. Growth curves, i.e., development of the average pellet size with agglomeration time, were determined in a 1.1 liter stirred vessel as a function of various operating conditions. Glass and Al silicate powders were most frequently used as model substances. Both solids were suspended in carbon tetrachloride whereby mixtures of water and glycol were used as binding liquids. Four distinct growth regimes were identified. The flocculation regime: the zero

growth regime; the fast growth regime; and the steady state regime. Significant results and observations are reported. R.C.T.

N81-14028# Southampton Univ. (England). Dept. of Aeronautics and Astronautics.

MEASUREMENTS OF FLUCTUATING DENSITY AND TEMPERATURE IN AN AXISYMMETRIC FLAME

Gautam T. Kalghatgi and P. T. Roberts Nov. 1979 33 p refs (Contract AT/2040/084)

(AASU-342) Avail: NTIS HC A03/MF A01

The crossed beam correlation method in its deflection mode was used to estimate rms fluctuation values and integral length scales in the density gradient field of an axisymmetric methane diffusion flame at forty and sixty diameters downstream of the exit plane. The Reynolds number based on exit diameter is 9200. A weighted rms density fluctuation was also evaluated from these measurements. The weighting factor was estimated by measuring length scales in the temperature field using two fine wire compensated thermocouples. From the measured temperature probability density functions, the rms density fluctuations are predicted and these values are compared with the suitably corrected values from crossed beam correlation measurements. The distributions of mean temperature, rms temperature fluctuation, and convection velocity in the temperature field at the two axial stations were also presented. Author

N81-14029# Defence Research Information Centre, Orpington (England).

THE RELATIONSHIP BETWEEN DIFFERENTIAL AREAS AND CONCENTRATION IN DERIVATIVE ABSORPTION SPECTROPHOTOMETRY

F. Defrancesco and A. Seppi Jul. 1980 21 p refs Transl. into ENGLISH from Riv. della Soc. Ital. di Sci. dell Aliment. (Italy), v. 8, no. 2, 1979 p 111-116

(DRIC-Trans-6127; BR75251) Avail: NTIS HC A02/MF A01

The use of derivative absorption spectra to resolve overlapping bands is discussed. It is used in relation to the problem of measuring concentrations in solution of mixtures of substances of biological interest such as chlorophyll and carotene. L.F.M.

N81-14030# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Cologne (West Germany). Abt. Verdichter.

POSSIBILITIES AND LIMITATIONS OF RAMAN SPECTROSCOPY IN LOCAL TEMPERATURE AND CONCENTRATION MEASUREMENTS IN FLAMES Ph.D. Thesis - Ruhr Univ.

Klaus Stursberg May 1980 254 p refs In GERMAN; ENGLISH summary

(DFVLR-FB-80-17) Avail: NTIS HC A12/MF A01; DFVLR, Cologne DM 48,90

The applicability of Raman scattering as a diagnostic tool was tested by means of a butane/air flame. An analysis of the flow field by aid of a laser combined with a lock-in-amplifier is impossible due to the statistically fluctuating intense flame emission. The energy concentration of a giant pulse laser, however, yields a sufficiently high signal to noise ratio permitting local temperature and concentration measurements within the whole flame region. The interpretation of the scattered light intensity distribution showed a disturbance of the population of the vibrational levels with Raman active molecules for N2 and O2. This discrepancy was a result of excited metastable energy status. Instead of the intensity ratio of two different vibrational lines, the contour of a single vibrational Raman line is analyzed, since this procedure enables reliable temperature measurements in flames. Author

N81-14031# Kansas State Univ., Manhattan. Dept. of Chemistry.

THE CHEMISTRY OF ENERGETIC FRAGMENTS Final Technical Report, May 1977 - Jun. 1980

Richard N. McDonald and Donald W. Setser 15 Oct. 1980 16 p refs

(Grant DAAG29-77-G-0142)

(AD-A091823; ARO-14511.7-C) Avail: NTIS HC A02/MF A01 CSCL 07/2

Following construction and testing of a flowing afterglow (FA) apparatus, two hypovalent anion radicals, negative cyclopentadienylidene and negative phenyl nitrene, were produced in the FA and the ion molecule chemistry of these two species was determined. GRA

N81-14032# AeroChem Research Labs., Inc., Princeton, N. J.

PROTOTYPE CHEMILUMINESCENT ANALYZER FOR MEASUREMENT OF HYDRAZINES Final Report, 5 Mar. 1979 - 31 Jan. 1980

Hermann N. Volltrauer Brooks AFB, Texas School of Aerospace Medicine Jul. 1980 16 p refs

(Contract F33615-79-C-0607; AF Proj. 7930)

(AD-A091678; AEROCHEM-TP-394; SAM-TR-80-13) Avail: NTIS HC A02/MF A01 CSCL 07/4

Three prototype chemiluminescent instruments were built that will measure concentration of hydrazine, MMH, and UDMH in the range of 0.01 to 100 part per million in air. Sensitivity of the instruments is 0.01 part per million hydrazine, 0.04 part per million MMH, and 0.07 part per million UDMH with an accuracy plus or minus 10%. Sensitivity toward the hydrazines as a function of various conditions is discussed along with the results of an interference study. Ways of decreasing cost, weights, and size of the units without adversely affecting sensitivity or reliability are suggested. GRA

N81-14033# California Univ., Los Angeles. Dept. of Chemistry.

ANALYSIS OF SPECTRAL DIFFUSION OF LOCALIZED TRIPLET SPIN TRANSITIONS WITHIN AN INHOMOGENEOUS PROFILE Interim Technical Report

A. R. Burns, M. A. El-Sayed, and J. C. Brock 1 Nov. 1980 23 p refs

(Contract N00014-75-C-0602)

(AD-A091714; TR-36) Avail: NTIS HC A02/MF A01 CSCL 07/4

The observation of rapid changes in the lineshape of a hole burned in the spectral profile of a zero field triplet spin transition indicates that spectral diffusion processes are occurring. A kinetic model which quantitatively reproduces the hole lineshape changes is used to calculate a spectral diffusion rate constant. The diffusion rate constant depends not only on the frequency shift (i.e., energy mismatch), but also on whether the excited molecule is deuterated, which suggests that the energy conserving spin flipping processes responsible for the homogeneous width are also responsible for spectral diffusion within the inhomogeneous profile. GRA

N81-14034# Georgia Inst. of Tech., Atlanta. School of Physics.

THE DRIFT, DIFFUSION, AND REACTIONS OF SLOW IONS IN GASES Summary Report, 1 Nov. 1979 - 31 Oct. 1980

E. W. McDaniel and I. R. Gatland 31 Oct. 1980 9 p refs

(Contract N00014-80-C-0243)

(AD-A091683) Avail: NTIS HC A02/MF A01 CSCL 07/4

The Georgia Tech program of research on ionic transport in gases is described. Experimental measurements of ionic mobilities and diffusion coefficients are discussed. The use of the mobility data to obtain ion neutral interaction potentials is described. References to recent publications are given, and the program for the next year is outlined. GRA

N81-14035# School of Aerospace Medicine, Brooks AFB, Tex. Aerospace Medical Div.

TEST AND EVALUATION OF AN ENERGETICS SCIENCE INCORPORATED MODEL 7660 ELECTROCHEMICAL HYDRAZINES ANALYZER Interim Report, 1 Mar. - 31 Jul. 1979

Leonard J. Luskus and Herman J. Kilian Jun. 1980 16 p refs

(AF Proj. 7930)

(AD-A091710; SAM-TR-80-10) Avail: NTIS HC A06/MF A01 CSCL 07/4

An Energetics Science Incorporated Model 7660 MMH analyzer was tested and evaluated for continuous real time measurement of Hz, MMH, and UDMH in air. Sensitivity to the hydrazines was approximately 0.06 ppm Hz, 0.04 ppm MMH, and 0.025 ppm UDMH. Accuracy and precision, determined at 0.1-ppm concentrations on an analyzer calibrated daily, were between 20% and 40% for the three hydrazines. Analyzer response time increased with age (use) of the sensor. At 100 hours of

analyzer operation, the time for 90% of final response was 20 min for Hz; 8 min, MMH; and 1 min, UDMH. Interference studies showed the analyzer responding strongly to ammonia and hydrogen sulfide and less strongly to alcohols and amines. There was also interference from simulated spills of hydraulic fluid, JP-4 fuel, and ECS fluid, with relative analyzer response as high as 6 ppm MMH in the spill area. Interference and response time problems prevent the analyzer, with the presently used liquid sensor, from being satisfactory for monitoring at or below the threshold limit values for any of the three hydrazines. The instrument is satisfactory for use as a low ppm leak detector if precautions are taken for distinguishing between the hydrazines and interferents. GRA

N81-14036# Naval Research Lab., Washington, D. C.
THE BROADENING OF SPECTRAL LINES BY AUTOIONIZATION, RADIATIVE TRANSITIONS, AND COLLISIONS Interim Report
V. L. Jacobs 22 Oct. 1980 47 p refs
(RR0130143)
(AD-A091506; NRL-MR-4365) Avail: NTIS HC A03/MF A01 CSCL 07/4

A comprehensive quantum mechanical theory of atomic spectral line shapes is developed within the framework of the Lippmann - Schwinger scattering theory adapted to the tetradic (Liouville) - space representation of density matrices. An expression for the spontaneous electric dipole rate is derived which has the same general form as the results obtained by Baranger and by Kolb and Griem for overlapping lines. The frequency dependent relaxation operator which occurs in this expression involves not only the collisional broadening interaction but also the interactions which give rise to autoionization and to both spontaneous and induced radiative transitions. Explicit expressions for the widths are obtained in the isolated line approximation by evaluating the lowest order nonvanishing contribution to the diagonal matrix elements of the relaxation operator. The total width is obtained as the sum of the rates for all inelastic transitions from the initial and final states comprising the spectral line and the term involving the square of the difference between the elastic scattering amplitudes. Finally, we present a qualitative discussion on how the partial widths vary with the states comprising the spectral line and with the physical properties of the surrounding particles and radiation field. GRA

N81-14037# Northwestern Univ., Evanston, Ill. Dept. of Chemistry.
BROMINE AS A PARTIAL OXIDANT. OXIDATION STATE AND CHARGE TRANSPORT IN BROMINATED NICKEL AND PALLADIUM BISDIPHENYLGLYOXIMATES: A COMPARISON WITH THE IONIDATED MATERIALS AND RESONANCE RAMAN STRUCTURE SPECTRA CORRELATIONS FOR POLYBROMIDES
David W. Kalina, Joseph W. Lyding, Malcolm S. McClure, Carl R. Kannewurf, and Tobin J. Marks 6 Oct. 1980 46 p refs Submitted for publication
(Contract N00014-77-C-0231; Grants NSF DMR-76-80847; NSF DMR-79-23573)
(AD-A091534; TR-13) Avail: NTIS HC A03/MF A01 CSCL 07/4

This paper presents an investigation of oxidation state and charge transport in the low dimensional materials Ni(dpg)2Br1.0 and Pd(dpg)2Br1.1, dpg – diphenylglyoximato. Resonance Raman structure spectra correlations are discussed for polybromides, and Br5 is assigned as the predominant halogen species in both of these materials. Thus, the M(dpg)2 units are formally in fractional oxidation states of ca. +0.20(2) (M = Ni) and +0.22(2) (M = Pd). In the optical spectra of both materials, a broad transition at 500 nm is related to the polybromide chains. Four-probe single crystal electrical conductivities (dc) in the stacking direction at 300 K are as high as .00091/omega cm (Ni(dpg)2Br1.0) and .00015/omega cm (Pd(dpg)2Br1.1). The conductivity is demonstrated to be thermally activated with activation energies of 0.33 and 0.21 eV, respectively. The transport properties of the brominated materials are found to be very similar to those of the related M(dpg)2I materials (M = Ni, Pd), a result contrary to expectations if the halogen chains were the major charge carrier. GRA

N81-14038# Texas A&M Univ., College Station.
A SURVEY OF CONCEPTS/TECHNIQUES FOR SENSING OXYGEN IN AIRCRAFT OXYGEN-GENERATING SYSTEMS Final Report, 1 Nov. 1978 - 1 Apr. 1979
W. A. Porter, D. A. Dietrich, H. K. Lesser, and J. D. Brand Dec. 1979 30 p refs
(Contract F33615-78-D-0629; AF Proj. 2787)
(AD-A091667; SAM-TR-79-33) Avail: NTIS HC A03/MF A01 CSCL 14/2

This survey has shown that the commercial market has concentrated mainly on chemical type oxygen sensors. We believe that industry in general is 'on top' of the opportunities for improving chemical type oxygen sensors, and that new developments in chemical sensors will most likely come from industry. Most work in the solid state sensor area has been very fundamental, and oxygen sensor development has not been pursued by industry. The solid state area is believed to offer good promise for the development of improved oxygen sensors, and further research should be conducted, particularly in the thin film oxide area. The area of fluidics also warrants further investigation. An approach using fluidic oscillators should be considered. A modified sound separation probe should also be considered as a possible acoustic approach. Questions of measurement sensitivity are of the greatest concern here however. Of all of the recommendations given above, we believe that the solid state area holds the best promise for immediate improvement. GRA

N81-14039# Sandia Labs., Albuquerque, N. Mex.
ISOTOPE EFFECT ON HYDROGEN SITE ENERGIES FOR TWO METAL DIHYDRIDES
E. L. Venturini 1980 16 p refs
(Contract DE-AC04-76DP-00789)
(SAND-79-1541C; CONF-800402-1) Avail: NTIS HC A02/MF A01

Electron spin resonance spectra measured the distribution of hydrogen adjacent to the Er, and the variation in this distribution with isotope and with hydrogen to metal ratio was studied for several samples of both host metals. These data are accurately described by a lattice gas model which yields the energy difference for protons or deuterons on octahedral and tetrahedral sites, both adjacent to the Er impurities and in the bulk host lattice. This energy difference is 10% greater for deuterons, and the change with isotope can be attributed primarily to the mass dependence of the vibrational part of the total energy associated with each site. Author

N81-14040# Sandia Labs., Albuquerque, N. Mex.
A THEORY OF DROPLET COMBUSTION AT HIGH PRESSURES
Melvin R. Baer Aug. 1980 86 p refs
(Contract DE-AC04-76DP-00789)
(SAND-80-0081) Avail: NTIS HC A05/MF A01

At high pressures, the theoretical model is composed of two separate parts. During droplet heatup when the temperature within the droplet is below its thermodynamic critical temperature, a quasi-steady diffusion film model is used. Incorporated in this model are the effects of nonideal gas behavior, including gas absorption in the liquid phase and the effect of droplet surface recession. When the droplet temperature exceeds the critical temperature limit, the diffusion is considered to be entirely time varying and the previous model provides the initial conditions to the pure diffusion controlled vaporization. A well known Green's function integral solution to the diffusion equation was used to deduce the supercritical combustion characteristics. The effects of convection were introduced by multiplicative Frossling corrections to the diffusion film coefficients. Author

N81-14041# Illinois Inst. of Tech., Chicago. Dept. of Chemical Engineering.
ELECTROCHEMISTRY OF ACETYLIDES, NITRIDES AND CARBON CATHODES IN MOLTEN HALIDES Progress Report
J. R. Selman Apr. 1980 12 p refs Sponsored by DOE
(DOE/ER-04445/T1) Avail: NTIS HC A02/MF A01

The EMF measurements in acetylide containing melts, calcium activity and diffusion coefficients in calcium-aluminum alloys, and synthesis of calcium intercalation compounds with graphite are

discussed. The electrochemistry of two major molten salt systems related to energy conversion are reviewed. E.D.K.

N81-14042# Exxon Research and Engineering Co., Linden, N.J. Corporate Research-Technology Feasibility Center.

FUNDAMENTAL CHARACTERIZATION OF ALTERNATE FUEL EFFECTS IN CONTINUOUS COMBUSTION SYSTEMS Summary Technical Progress Report, 15 Aug. 1978 - 31 Jan. 1980

W. S. Blazowski, R. B. Edelman (Science Applications, Inc., Canoga Park, Calif.), and E. Wong (Science Applications, Inc., Canoga Park, Calif.) 27 Feb. 1980 123 p refs

(Contract DE-AC03-77ET-11313)

(DOE/ET-11313/T1) Avail: NTIS HC A06/MF A01

The development of fuel flexible combustion systems for gas turbines as well as Rankine and Stirling cycle engines is explored. The primary emphasis of the program is on liquid hydrocarbons produced from nonpetroleum resources. Fuel flexible combustion systems provide for more rapid transition of these alternative fuels into future energy utilization centers (especially utility power generation with the combined cycle gas turbine). The specific technical objectives are: (1) develop an improved understanding of relationships between alternative fuel properties and continuous combustion system effects; and (2) provide analytical modeling/correlation capabilities to be used as design aids for development of fuel tolerant combustion systems. Key findings concern stirred combustor soot production during operation at controlled temperature conditions, soot production as a function of combustor residence time, an improved measurement techniques for total hydrocarbons and initial stirred combustor results of fuel nitrogen conversion. A new combustor which combusts liquid fuel injected into the reactor as a spray was developed and described. S.F.

N81-14043# Georgia Inst. of Tech., Atlanta. School of Nuclear Engineering.

DEVELOPMENT AND APPLICATION OF THE ELECTROCHEMICAL ETCHING TECHNIQUE Annual Progress Report

Aug. 1980 66 p refs

(Contract DE-AS05-76EV-04814)

(DOE/EV-04814/T1) Avail: NTIS HC A04/MF A01

Electrochemical etching of polycarbonate foils (ECEPF) for fast, intermediate, and thermal neutron dosimetry as well as alpha particle dosimetry is described. The fast (greater than 1.1 MeV) and thermal neutron dosimetry techniques were applied to a thorough investigation of the neutron contamination inherent in and about the primary X-ray beam of several medical therapy electron accelerators. Because of the small size of ECEPF dosimeters in comparison to other neutron meters, they have an unusually low perturbation of the radiation field under measurement. Due to this small size and the increased sensitivity of the ECEPF dosimeter over current techniques of measuring neutrons in a high photon field, the fast neutron contamination in the primary X-ray beam of all the investigated accelerators was measured with precision and found to be greater than that suggested by the other, more common, neutron dosimetry methods. Author

N81-14044# Department of Energy, Morgantown, W. Va. Energy Technology Center.

DEVELOPMENT OF A SIMPLE FLUIDIZED-BED COAL COMBUSTION MODEL FOR THE ASSESSMENT OF A PRESSURIZED FLUIDIZED-BED COMBUSTION SYSTEM FOR ELECTRICAL POWER GENERATION

S. C. Saxena (Illinois Univ., Chicago) and D. G. Turek (Science Applications, Inc., Morgantown, W. Va.) Jul. 1980 141 p refs

(DOE/METC/SP-80/15) Avail: NTIS HC A07/MF A01

The model considered all the essential ingredients of coal combustion and sulfur absorption in fluidized bed reactors. These included coal devolatilization, char combustion in a bed of dolomite or calcium carbonate, sulfur retention in the fluidized bed elutriation from the bed, and heat removal by cooling tubes imbedded in the bed. The model is presented and a numerical scheme was proposed which will permit the calculation of bed temperature, coal combustion efficiency, sulfur retention, flue gas composition, and overflow from the bed. Numerical results are presented in which the dependence of the various combustion and operating parameters was examined. Author

N81-14045# Massachusetts Univ., Amherst. Dept. of Chemistry.

AN ANALYTICAL CHEMICAL SYSTEM FOR THE DETERMINATION OF HEAVY METALS AND ORGANIC COMPOUNDS Annual Progress Report, 1 Dec. 1979 - 30 Nov. 1980

Sidney Siggia and Ramon M. Barnes 15 Aug. 1980 38 p refs

(Contract DE-AC02-77EV-04320)

(DOE/EV-04320/1) Avail: NTIS HC A03/MF A01

The synthesis, characterization, and application of sequestering resins for the measurement of inorganic and organic compounds at trace and ultratrace levels found in energy related materials are described. The major synthesis effort was directed toward creation of resins for inorganic and organic compounds. Although a number of new resins were created, only a few provided the quality required for extended analytical applications. In particular, the poly(dithiocarbonate) resin was extended to 59 elements and continues under investigation for metal sequester, and a new poly(acrylamidoxide) resin was found to complex 17 elements with strong possibility for more and was applied in the trace metal analysis of seawater and fresh pond water. Both resins exhibit the capability to sequester specific oxidation states selectively which introduces the possibilities for chemical speculation. S.F.

N81-14046# Massachusetts Univ., Amherst. Dept. of Chemistry.

AN ANALYTICAL CHEMICAL SYSTEM FOR THE DETERMINATION OF HEAVY METALS AND ORGANIC COMPOUNDS Annual Progress Report, 1 Dec. 1978 - 30 Nov. 1979

Sidney Siggia and Ramon M. Barnes 24 Oct. 1979 51 p refs

(Contract EE-77-S-02-4320)

(DOE/EV-04320/3) Avail: NTIS HC A04/MF A01

The synthesis, characterization, and application of sequestering resins for the measurement of inorganic and organic compounds at trace and ultratrace levels is discussed. The properties of poly(dithiocarbonate) resin as a metal sequestering agent are reviewed and the development of complementary resins, particularly poly(acrylamidoxime), is described. Several porous polymers are investigated to determine their properties for the concentration of organics from aqueous solutions. In addition, instrumentation required for the simultaneous multielement analysis of trace metals is discussed. M.G.

N81-14047# Oak Ridge National Lab., Tenn. Physics Div.

HELIUM-JET COUPLED MASS SEPARATOR: ADVANCES AND DIRECTIONS

D. M. Moltz 1980 9 p refs Presented at the 10th Intern. Conf. on Electromagnetic Isotope Separators, Zinal, Switzerland, 31 Aug. 1980

(Contract W-7405-eng-26)

(CONF-800870-1) Avail: NTIS HC A02/MF A01

The design of a helium jet and ion source system is discussed. This fast transport helium jet system should permit studies of nuclides with half lives down to 50 ms. DOE

N81-14048# Oak Ridge National Lab., Tenn. Solid State Div.

IMPURITY STUDIES IN FUSION DEVICES USING LASER-FLUORESCENCE-SPECTROSCOPY

W. R. Husinsky (Vienna Technical Univ., Austria) Aug. 1980 32 p refs Presented at the Am. Vacuum Soc. Conf., Detroit, 13 Oct. 1980

(Contract W-7405-eng-26)

(CONF-801037-17) Avail: NTIS HC A03/MF A01

The laser fluorescence technique is described in terms of its application to metallic impurities in fusion devices and related laboratory experiments. Particular attention is given to results from the ISX-B Tokamak using pulsed dye lasers where detection sensitivities for neutral Fe of 1,000,000 atoms/cu cm with a velocity resolution of 600 m/sec (0.1eV) were achieved. Techniques for exciting plasma particles are also discussed. DOE

N81-14049# Utah Univ., Salt Lake City.
STUDY OF COMBUSTION AND FLAME PROCESSES INITIATED BY IR LASER-INDUCED ABSORPTION Annual Progress Report, 1 Jan. - 31 Dec. 1980
William Arnold Guillory 1 Aug. 1980 15 p refs
(Contract DE-AS02-78ER-04695)
(COO-4695-4) Avail: NTIS HC A02/MF A01

Simulated flame and combustion processes were initiated by multiplephoton absorption from high power infrared (IR) laser sources. Subsequent examination of the system was performed by dye laser induced fluroescence (LIF), multiphoton spectroscopy, and visible and infrared emission. The reaction dynamics of the C3 radical in the presence of O2, NO and various hydrocarbons were investigated. The production of C3 radicals, vibrational relaxation and chemical kinetics following IR photolysis of allene were examined. DOE

N81-14050# Los Alamos Scientific Lab., N. Mex. Theoretical Div.
USE OF R-MATRIX METHODS FOR LIGHT ELEMENT EVALUATIONS
G. M. Hale 1980 23 p refs Presented at the Workshop on Evaluation Methods and Procedures, Upton, New York, 22-25 Sep. 1980
(Contract W-7405-eng-36)
(LA-UR-80-2673; CONF-800979-4) Avail: NTIS HC A02/MF A01

Some general aspects of parameterizing nuclear reaction data with a unitary, multichannel theory are discussed. The special case of R matrix theory are discussed. The special case of R matrix theory is considered, where the explicit separation of long and short range forces and the natural occurrence of energy pole terms afford a number of advantages in describing data for light element reactions. Examples are given for both neutron and charged particle induced reactions which illustrate multichannel R matrix techniques, including the use of charge symmetry to relate data for mirror systems. The limitations of conventional R matrix methods are discussed briefly. DOE

N81-14051# Mound Lab., Miamisburg, Ohio.
COMBINED ELECTROLYSIS CATALYTIC EXCHANGE (CECE)
Robert E. Ellis, Thomas K. Mills, and Michael L. Rogers 30 Sep. 1980 19 p refs
(Contract DE-AC04-76DP-00053)
(MLM-2774) Avail: NTIS HC A02/MF A01

Starting from an effort to control airborne emissions, the Mound tritium containment program evolved to include development of the Combined Electrolysis Catalytic Exchange process. This process separates tritiated aqueous streams into detritiated water and an enriched hydrogen stream that is suitable for use by other tritium recovery processes. Experimentation showed that the process performs as predicted by bench scale measurements, and that available process components exhibit acceptable resistance to damage by radiation from tritium exposure. Planned future efforts are concentrated on finalizing automatic control of the process and on developing feed treatment methods for the protection of process components. DOE

N81-14052# California Univ., Livermore. Lawrence Livermore Lab.
PROPERTIES OF LEAD-LITHIUM SOLUTIONS
N. J. Hoffman, A. Darnell, and J. A. Blink Oct. 1980 11 p refs Presented at the 4th ANS Topical Meeting on the Technol. of Controlled Nucl. Fusion, King of Prussia, Pa., 14-17 Oct. 1980 Prepared in cooperation with Energy Technology Engineering Center, Canoga Park, Calif.
(Contract W-7405-eng-48)
(UCRL-84273; CONF-801011-9) Avail: NTIS HC A02/MF A01

The properties of Pb-Li solutions including the effect of hydrogen impurities are reviewed, and the reactor design implications are discussed. In general, the properties of Pb-Li solutions are not approximated by taking the properties of the pure elements and interpolating linearly with atom fraction. A maxima or minima generally occurs at 20 a/o Pb and approximations can be made by interpolating between 0-20 a/o Pb and 20-100 a/o Pb values. Pb-Li solutions are very far from ideal solutions, exhibiting extreme negative deviation from ideality. The Li vapor pressure above a high-Pb eutectic melt at 500 C, for example, is calculated to be more than three orders of magnitude less than predicted from ideal behavior. Deviation from ideality becomes more pronounced as temperature is lowered. DOE

N81-14053# National Bureau of Standards, Washington, D.C. Center for Analytical Chemistry.
THE DEVELOPMENT OF POTENTIAL THIN STANDARDS FOR CALIBRATION OF X-RAY FLUORESCENCE SPECTROMETRY Final Report
P. A. Pella Jun. 1980 50 p refs
(Grant EPA-IAG-D8-E684)
(PB80-220239; EPA-600/7-80-123) Avail: NTIS HC A03/MF A01 CSCL 07D

A focused ion beam sputtering technique was investigated as a candidate method for fabricating thin glass films containing known concentrations of metals on polycarbonate substrates. It was found that rather severe changes in instrumental parameters do not affect the elemental composition of the films appreciably. Up to eight substrates were coated at one time and the compositional reproducibility as measured by X-ray fluorescence for Si, Ca, Zn, and Pb for 13 samples was within five percent relative standard deviation at mass loadings of glass from 160, 190 micrograms/cm. Glass films containing phosphorous and sulfur were also prepared to demonstrate the feasibility of preparing glass films containing such elements of low atomic number. GRA

N81-14054# Dayton Univ., Ohio.
DESIGN CONSIDERATIONS FOR A THERMAL DECOMPOSITION ANALYTICAL SYSTEM
Wayne A. Rubey Aug. 1980 161 p refs
(Grant EPA-R-805117)
(PB80-219116; EPA-600/2-80-098) Avail: NTIS HC A08/MF A01 CSCL 14B

Controlled high temperature incineration is one of the most promising methods for obtaining safe and permanent disposal of highly toxic organic wastes. A sophisticated laboratory system was designed and assembled to provide fundamental thermal decomposition data on a wide assortment of organic materials. This thermal decomposition analytical system (TDAS) is a specially designed, closed, continuous system consisting of a versatile and fully instrumented thermal decomposition unit which is connected to dedicated in line gas chromatography, mass spectrometry, and data reduction equipment. The TDAS was designed to generate fundamental thermal decomposition data rapidly, economically, and safely. These laboratory data should be instrumental in establishing acceptable criteria for controlled high temperature incineration of toxic organic wastes. GRA

N81-14055# California Univ., Berkeley.
ON-LINE ZEEMAN ATOMIC ABSORPTION SPECTROSCOPY FOR MERCURY ANALYSIS IN OIL SHALE GASES
D. C. Girvin Jun. 1980 112 p refs
(Contract EPA-68-03-2667)
(PB80-216922; EPA-600/7-80-130) Avail: NTIS HC A06/MF A01 CSCL 14B

The development and initial testing of instrumentation for continuous online analytical measurement of mercury concentrations in complex gas streams or in ambient air, in the presence of smoke, organic vapors, and oil mist from oil shale processing plants is described. The technique was Zeeman atomic absorption spectroscopy. The mercury monitor described is not susceptible to interferences which plague other methods and thus may be used to characterize mercury emissions on a realtime basis. This mercury monitor will find immediate application for the characterization of synfuel and other industrial emissions, mobile source identification, and environmental health monitoring. GRA

N81-14056# Argonne National Lab., Ill. Chemical Engineering Div.
SUPPORT STUDIES IN FLUIDIZED-BED COMBUSTION Annual Report, Oct. 1978 - Sep. 1979
Irving Johnson, K. M. Myles, W. M. Swift, S. H. D. Lee, J. A. Shearer, A. A. Siczek, F. G. Teats, W. I. Wilson, W. A. Boyd, and E. B. Smyk Aug. 1980 81 p refs
(Contracts W-31-109-eng-38; EPA-IAG-DS-E681)

(PB80-218613; ANL/CEN/FE-79-14; EPA-600/7-80-156; IERL-RTP-1082) Avail: NTIS HC A05/MF A01 CSCL 13B

Laboratory and process development studies were aimed at providing needed information on limestone utilization. The removal of particulates and alkali metal compounds from the flue gas, control of SO2 and trace pollutant emissions, the mechanism of attrition in fluidized beds, a method of determining the attrition resistance of sorbents, and other aspects of fluidized bed coal combustion are described. GRA

N81-14057# National Technical Information Service, Springfield, Va.

ELECTROCHEMICAL METHODS OF CHEMICAL ANALYSIS. CITATIONS FROM THE NTIS DATA BASE Progress Report, 1976 - Aug. 1980

Diane M. Cavagnaro Aug. 1980 196 p Supersedes NTIS/PS-79/1025 and NTIS/PS-78/0966

(PB80-815053; NTIS/PS-79/1025; NTIS/PS-78/0966) Avail: NTIS HC $30.00/MF $30.00 CSCL 07D

Polarographic, potentiometric, voltametric, and coulometric techniques are covered, including electrochemical titrations. Studies on ion elective electrodes are excluded. GRA

N81-14160*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.

THE IDENTIFICATION OF TRENDS IN OUTGASSING TECHNOLOGY

Joe A. Colony *In its* The 11th Space Simulation Conf. 1980 p 280-290 (For primary document see N81-14138 05-31)

Avail: NTIS HC A19/MF A01 CSCL 07D

26 METALLIC MATERIALS

Includes physical, chemical, and mechanical properties of metals, e.g., corrosion; and metallurgy.

N81-14058# Leybold-Heraeus G.m.b.H., Hanau/Main (West Germany).

PRODUCTION OF HIGH PURITY METAL AND METAL-ALLOY POWDERS FREE OF OXYGEN FOR SUBSEQUENT PROCESSING OF HIGH-QUALIFIED SINTERING AND SEMI-FINISHED PARTS Final Report

Herbert Schmitt Bonn Bundesministerium fuer Forschung und Technologie Dec. 1979 99 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie

(BMFT-FB-T-79-173; ISSN-0340-7608) Avail: NTIS HC A05/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 20,60

Two different metal atomization plants were built and tested: an argon atomization plant for nickel-base-alloys and a centrifugal atomization plant (electron beam rotating disc) operating under high vacuum, which also works for titanium and titanium alloys. The nickel base powder produced met the specifications as to spherical size and shape as well as being free of gases to a far extent; the titanium alloy powder atomized under vacuum according to the centrifugal principle showed a high purity. The economy of both processes in respect of yield and process speed is satisfactory. The sintered parts produced from powder in principle showed the same physical characteristics to be found in the melting metallurgical samples. T.M.

N81-14059# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Cologne (West Germany). Abteiliung Bruchmechanik und Mechanische Beanspruchung.

INFLUENCE OF ENVIRONMENT ON CONSTANT LOAD AND FATIGUE CRACK PROPAGATION OF TITANIUM ALLOYS Ti-6Al-4V AND Ti-8Al-1Mo-1V Ph.D. Thesis - Karlsruhe Univ.

Hubert Doeker Feb. 1980 183 p refs In GERMAN; ENGLISH summary

(DFVLR-FB-80-08) Avail: NTIS HC A09/MF A01; DFVLR, Cologne DM 38,20

The measurements of crack propagation rate were supplemented by electrochemical measurements and fractography, and by crack propagation measurements in vacuum, air, and distilled water. In the salt solution at constant load, cracks propagate at K sub I values far below K sub I scc. In fatigue also, cracks propagate by cyclic stress corrosion at K sub I max values well below K sub I scc. The delta K sub I value for the beginning of crack propagation by the stress corrosion mechanism is frequency dependent. It is lower for higher frequencies. The test results are discussed taking as a basis hydrogen assisted cracking. Author

N81-14060# Battelle Columbus Labs., Ohio.

COMPUTER SIMULATIONS FOR THE MICROSCOPIC MECHANISM OF HOT GAS EROSION Final Report, 1 Sep. 1977 - 31 Aug. 1980

Bruce C. Garrett Sep. 1980 48 p refs

(Contract DAAG29-77-C-0047)

(AD-A091859; ARO-15042.4-MS) Avail: NTIS HC A03/MF A01 CSCL 09/2

A systematic technique for obtaining physical reasonable models of gas surface interaction potentials was employed. A general computer model has been developed to provide realistic, interaction potentials for chemical reactions of gas species on a variety of surface structures. In order to better understand the model interaction potentials a computer program was developed to help probe and characterize the potential energy hypersurfaces. This enabled critical configurations such as equilibrium geometries and saddle points to be located; the program also provided minimum energy pathways for reactions occurring on the metal surfaces. Classical trajectory studies were carried out for models of direct chemical reaction of gas phase species with surfaces and for atomic recombination reactions occurring on the surfaces. The atomic recombination studies dealt with hydrogen and nitrogen atom recombination on Fe and Ta surfaces. These studies showed that the heat inputed into the surface from the atomic recombination reaction can be a significant fraction of the total energy of the heat release of the process. GRA

N81-14061# Systems Research Labs., Inc., Dayton, Ohio. Research Applications Div.

THE STRESS BEHAVIOR OF THREE ADVANCED NICKEL BASE SUPERALLOYS DURING HIGH TEMPERATURE LOW CYCLE FATIGUE Technical Report, Jan. 1977 - Aug. 1978

Henry L. Bernstein Jun. 1980 243 p refs

(Contract F33615-76-C-5191; AF Proj. 7351)

(AD-A091694; SRL-9799; AFWAL-TR-80-4075) Avail: NTIS HC A11/MF A01 CSCL 11/6

This report is a compilation of data on stress behavior as a function of cycles obtained during high temperature, low cycle fatigue tests on three advanced Ni-base superalloys--Rene 95, AF-115, and AF2-1DA. The data are presented in both tabular and graphical formats. The materials studied are those used for jet engine turbine disks, and the fatigue tests were conducted at their operating temperatures. The purpose of this report is to make the test data available to the technical community. No discussion is presented on an analysis or an understanding of the data, although some observations are included. GRA

N81-14062# Army Armament Research and Development Command, Watervliet, N. Y. Large Caliber Weapons Systems Lab.

DETERMINATION OF PHASE TRANSFORMATION TEMPERATURES OF TITANIUM-NICKEL USING DIFFERENTIAL THERMAL ANALYSIS

R. Vincent Milligan Oct. 1980 25 p refs Presented at 4th Intern. Conf. on Titanium, Kyoto, 19-22 May 1980

(DA Proj. 1L1-61102-AH-42)

(AD-A091792; AD-E440096; ARLCB-TR-80037) Avail: NTIS HC A02/MF A01 CSCL 11/6

Some of the more popular methods used to determine phase transformations in metals are X-ray, dilatometry, and electrical resistivity. Data reported for the TiNi alloy using Differential Thermal Analysis (DTA) is quite sparse and it appears that little effort has been made to correlate these results with X-ray dilatometry, or resistivity data. The purpose of this investigation was to determine the Ms and As temperatures for several alloys having compositions near 50 atomic percent titanium. The DTA method was used. The results are compared with those reported by several investigators that used different techniques. The DTA data obtained shows excellent agreement with Kornilov's As

temperatures, as a function of composition, obtained by dilatometry. A small variation was found between the results of this study and Wasilewski's X-ray data, and Hanlon's resistivity measurements for the Ms temperatures. It is concluded from this investigation that DTA analysis is a credible method for determining phase transformation temperatures for the TiNi material. GRA

N81-14063# Battelle Columbus Labs., Ohio.
DEVELOPMENT OF MIL-HDBK-5 DESIGN ALLOWABLE PROPERTIES FOR SEVERAL AEROSPACE MATERIALS Final Report, 25 Apr. 1977 - 29 Aug. 1980
Paul E. Ruff Aug. 1980 93 p
(Contract F33615-77-C-5036)
(AD-A091602; AFWL-TR-80-4109) Avail: NTIS HC A05/MF A01 CSCL 11/6

This final report describes a test program to determine MIL-HDBK-5 design allowable properties for 2024-T42 extrusion and Ti-6Al-2Sn-4Zr-2Mo, duplex annealed, sheet. GRA

N81-14064# Massachusetts Inst. of Tech., Cambridge. Lab. for Manufacturing and Productivity.
PREVENTION OF SPLINE WEAR BY SOFT METALLIC COATINGS Final Report, 1 Jan. 1977 - 30 Jun. 1979
Nannaji Saka, Hyo Chol Sin, and Nam P. Suh Jul. 1980 71 p refs
(Contract N00014-76-C-0068)
(AD-A091861; MIT/LMP/TRB-80-2) Avail: NTIS HC A04/MF A01 CSCL 01/3

The purpose of this cooperative program between MIT, Naval Air Development Center (NADC) and Foxboro-Analytical is to study the mechanism of wear and increase the wear resistance of aircraft splines. In addition to testing a much larger number of splines under a variety of conditions than has been done so far, optical microscopy, scanning electron microscopy and ferrography have been extensively used to identify the wear mechanism. Test specimens of aircraft splines were coated with Au, Ni, Ag and Cd with various thicknesses (0.1 - 10 micron m) and tested in the SwRI spline wear tester with and without grease. The gold coated splines exhibited induction periods of 250 hours, which is four times that exhibited by the uncoated splines. Ni, Ag and Cd failed to increase the induction period. Unlubricated splines wore exactly at the same rate as the post-induction wear rates of the grease lubricated splines. Optical and scanning electron microscopy results indicate that the mode of wear is by subsurface deformation, crack nucleation and growth processes (i.e., by the delamination mechanism) both in the induction and the post-induction periods. Analysis of the splines by the energy dispersive X-ray analysis showed that the metallic coatings did not react with grease. This and other evidence indicates that the costing/substrate bond strength is an important factor in the wear of splines. Methods for improving the bond strength and reducing the cost of the coatings are suggested. GRA

N81-14065# Naval Research Lab., Washington, D. C. Material Science and Technology Div.
COMPARISON OF THE TEMPERATURE-DEPENDENT ELASTIC MODULUS OF TiFe WITH H-DOPED TiFe IN THE (111) DIRECTION Final Report
J. R. Neighbours (Naval Postgraduate School), A. C. Ehrlich, R. A. Masamura, and C. L. Vold 22 Oct. 1980 10 p refs
(rr0220146)
(AD-A091507; NRL-8437) Avail: NTIS HC A02/MF A01 CSCL 11/6

The velocity of sound has been measured as a function of temperature between 4 and 300 K in the intermetallic compound TiFe and in H-doped TiFe. The data were taken in the (111) direction and yield a modulus of 2.64 x 10 to the plus 12 dyne/centimeters squared for that direction at room temperature in pure TiFe. Addition of H (approximately 0.4 at.%) increases the room temperature modulus by 0.9%. By using estimates of the thermal expansion the moduli have been obtained as a function of temperature and at low temperatures show a decrease with H addition - in contrast to the room temperature behavior. GRA

N81-14066# Massachusetts Inst. of Tech., Cambridge. Dept. of Mechanical Engineering.
INFLUENCES OF GASEOUS ENVIRONMENT ON LOW GROWTH-RATE FATIGUE CRACK PROPAGATION IN STEELS Annual Report, Jan. 1980
Robert O. Ritchie, S. Suresh, and J. Toplosky 1980 43 p refs
(Contract DE-AC02-79ER-10389)
(DOE/ER-10389/1; FPL/R/80/1030; AR-1) Avail: NTIS HC A03/MF A01

A fully martensitic 300 M ultrahigh strength steel and a fully bainitic 2 1/4Cr-1Mo lower strength steel are investigated in environments of ambient temperature moist air and low pressure dehumidified hydrogen and argon gases over a wide range of growth rates from 10 to the minus 8 power to 10 to the minus 2 power mm/cycle, with particular emphasis given to behavior near the crack propagation threshold delta K sub zero. It is found that two distinct growth rate regimes exist where hydrogen can markedly accelerate crack propagation rates compared to air, (1) at near threshold levels below (5x10 to the minus 6 power mm/cycle) and 2) at higher growth rates, typically around 10 to the minus 5 power mm/cycle above a critical maximum stress intensity. Hydrogen-assisted crack propagation at higher growth rates is attributed to a hydrogen embrittlement mechanism, with evitical maximum stress intensity nominally equal to the sustained load stress corrosion threshold in high strength steels, and far below this in the strain rate sensitive lower strength steels. Hydrogen assisted crack propagation at near threshold levels is attributed to a new mechanism involving fretting-oxide-induced crack closure generated in moist (or oxygenated) environments. Author

N81-14067# Southwest Research Inst., San Antonio, Tex.
THE STUDY AND MODELING OF HIGH TEMPERATURE FATIGUE CRACK PROPAGATION IN AUSTENITIC STAINLESS STEEL Progress Report, 1980
D. L. Davidson 1 Sep. 1980 17 p refs
(Contract DE-AS05-79ER-10475)
(DOE/ER-10475/T1) Avail: NTIS HC A02/MF A01

Crack tip plasticity parameters for fatigue cracks which have been grown at high temperature, with and without the effects of rate (frequency, hold times) and environment are presented, along with mathematically modeled crank growth. Techniques include (1) an ambient temperature fatigue stage for the scanning electron microscope (SEM); (2) a high temperature fatigue stage for the SEM; (3) a long focal length microscope with camera for optically monitoring fatigue crack growth in situ; (4) a depth of knowledge in application of electron channeling techniques for strain measurement; and (5) a high temperature environment cell. S.F.

N81-14068# Westinghouse Electric Corp., Red Bank, N.J. Research and Development Center.
STUDY TO OPTIMIZE Cr-Mo STEELS TO RESIST HYDROGEN AND TEMPER EMBRITTLEMENT Quarterly Report, 15 Aug. - 15 Nov. 1979
B. J. Shaw 23 Jul. 1980 27 p ref
(Contract DE-AC05-78OR-13513)
(DOE/ET-13513/T1; Rept-80-9D9-HYTEM-R1; QR-5) Avail: NTIS HC A03/MF A01

Results of tests designed to measure the threshold stress intensity in H2S of the peak hardness zone in the HAZ of welds in 21/4 Cr-1 Mo plate are given. Difficulty was encountered because of a variability in the location of the peak hardness zone relative to the weld-base interface. Details of the forging process and the status of the program are also presented. Author

N81-14069# California Univ., Berkeley. Dept. of Materials Science and Mineral Engineering.
LOW ALLOY STEELS THAT MINIMIZE THE HYDROGEN-CARBIDE REACTION, PART 1 Final Technical Report, 1 Oct. 1978 - 30 Sep. 1979
R. J. Kar, E. R. Parker, and V. F. Zackay 1979 73 p refs
(Contracts DE-AM03-76SF-00034; DE-AT03-76ER-70296)
(DOE/ER-70296/T1) Avail: NTIS HC A04/MF A01

Metallurgical parameters that control the reactions of hydrogen with carbides in steels are investigated. A literature review of the phenomenon of decarburization and methane bubble formation in steels is included. An experimental technique for

investigating hydrogen attack in laboratory conditions is established. Microstructural mechanical property evaluations were carried out on two series of alloys: the first was based on a plain carbon steel to which binary and ternary alloy additions were made to vary the carbide structure and morphology and assess these effects on the observed hydrogen attack resistance. The second group of steels consisted of commercial Mn-Mo-Ni and Cr-Mo steels and their alloy modifications, with a view towards developing steels with improved hydrogen attack resistance. S.F.

N81-14070# Pittsburgh Univ., Pa. Dept. of Metallurgical and Materials Engineering.
HOT CORROSIVITY OF COAL GASIFICATION PRODUCTS ON GAS TURBINE ALLOYS Summary Report, 15 Apr. 1978 - 15 Nov. 1979
G. H. Meier and E. A. Gulbransen 1979 115 p refs
(Contract DE-AC01-79ET-13547)
(DOE/ET-13547/T1) Avail: NTIS HC A06/MF A01

The major steps in the chronology of hot corrosion of Ni-, Co-, and Fe-base alloys under the influence of deposits likely to form when coal conversion products are used as fuels were studied. These steps involve the melting and wetting behavior of sulfate deposits, the initiation of rapid hot corrosion, and the propagation of the attack. The effects of alloy composition and microstructure, salt composition, temperature, atmosphere composition and thermal cycling on these phenomena were observed. Results show that (1) simple Cr_2O_3 forming alloys of both Co and Ni have good hot corrosion resistance to most of the deposits likely to form in turbines burning coal conversion products with the exception of deposits containing considerable amounts of chlorides; (2) uncoated alloys will not be able to provide the required combination of corrosion resistance and high temperature strength for any of the components in turbines running on coal gas; and (3) several alloys including Co-18Cr-6A1-1Hf, Co-27Cr, Co-20Ni-27Cr, Ni-50Cr, and Fe-18Cr-6A1-Hf have corrosion resistance for use as coatings and claddings at high temperatures (900-1000 C). A.R.H.

N81-14071# Exxon Research and Engineering Co., Linden, N.J.
HOT CORROSION/EROSION TESTING OF MATERIALS FOR APPLICATION TO ADVANCED POWER CONVERSION SYSTEMS USING COAL-DERIVED FUELS. TASK 2: FLUIDIZED BED COMBUSTION Final Report, 1 Jul. 1976 - 30 Sep. 1979
M. S. Nutkis, M. D. Loughnane, M. Ernst, R. R. Bertrand, and E. S. Matulevicius Nov. 1979 160 p refs
(Contracts DE-AC01-76ET-10541; EX-76-C-01-2452)
(FE-2452-39) Avail: NTIS HC A08/MF A01

An experimental basis for specifying materials for heat exchangers and gas turbines exposed to a pressurized fluidized bed combustor environment is provided. A 1000 hour test was completed which: (1) exposed heat exchanger materials both within the fluidized bed and in the freeboard of a pressurized fluidized bed combustor at temperatures ranging from 1050 to 1600 F for up to 1117 hours; and (2) provided the first successful long term exposure of turbine blade materials subjected to PFBC flue gas where the particulates were removed solely by cyclones. Operating conditions and major observations during this test period are reported. DOE

N81-14072# Battelle Pacific Northwest Labs., Richland, Wash.
AIR OXIDATION AND SEAWATER CORROSION HASTELLOY S AND HASTELLOY C-4
H. T. Fullam Mar. 1980 75 p refs
(Contract DE-AC06-76RL-01830)
(PNL-3344) Avail: NTIS HC A04/MF A01

Corrosion tests were conducted on Hastelloy S and Hastelloy C-4 to determine if either of these materials would meet licensing requirements for the outer capsules of (Sr-90) F2-fueled radioisotope heat sources for terrestrial applications. Both alloys were studied at temperatures of 600C, 700C, and 800C for periods up to 10,000 hours. Tensile specimens were oxidized under similar conditions and then tested at room temperature. Both alloys were found to form adherent layers that serve to protect the underlying metal. The oxidation rates in air follow parabolic rate relationships, except for an initial deviation, for exposures up to 5,000 hours. Long exposures lead to narrower deviations. There was no evidence of breakaway spilling or cracking of the oxide layer during oxidation. Test specimens were also submerged in unfiltered seawater for the same time period. Evaluation of the seawater corrosion data shows that an outer capsule fabricated from either Hastelloy S or Hastelloy C-4 could meet the seawater corrosion requirement; however, Hastelloy S exhibits a lower corrosion rate in seawater than does Hastelloy C-4, used if other consideration so dictate. A.R.H.

N81-14073# Battelle Columbus Labs., Ohio.
HIGH-TEMPERATURE EROSION-CORROSION OF ALLOYS Final Report
I. G. Wright and R. B. Herchenroeder (Cabot Corp., Kokomo, Ind.) Jul. 1980 230 p refs
(EPRI Proj. 979-5)
(EPRI-CS-1454) Avail: NTIS HC A11/MF A01

An apparatus was developed for the study of erosion processes at elevated temperatures. The erosion was examined for a wide range of alloys by 15 micrometers alumina particles at 63 and 170 fps at temperatures up to 1600 F in argon, a simulated combustion gas, and a simulated gasifier atmosphere. DOE

N81-14074# California Univ., Livermore.
RECENT ADVANCES IN Pt COATING OF MICROSPHERES BY A BATCH MAGNETRON SPUTTERING PROCESS
E. J. Hsieh and S. F. Meyer 29 Aug. 1980 17 p refs Presented at the Am. Vacuum Soc. Conf., Detroit, 13-17 Oct. 1980
(Contract W-7405-eng-48)
(UCRL-84478; CONF-801037-19) Avail: NTIS HC A02/MF A01

Some proposed inertial confinement fusion targets require high Z, high density metal coatings on glass microspheres. Platinum, which satisfies the high Z and density requirements, can be coated onto microspheres with a batch magnetron sputtering process incorporating oxygen as a dopant gas to prevent the microspheres from sticking. Progress is outlined in three areas: (1) the coating process was improved; (2) the oxygen content and resistivity of the oxygen doped platinum films are analyzed; and (3) the roles oxygen may play in reducing microsphere sticking during sputtering are discussed in regard to cold welding. Van der Waals bonding, electrostatic sticking, and sintering. DOE

N81-14075# New England Research Application Center, Storrs, Conn.
CRYOGENIC AGING OF METALS. CITATIONS FROM THE NTIS DATA BASE Progress Report, 1970 - Apr. 1980
C. Gilbert Young May 1980 116 p Sponsored in part by NTIS
(PB80-808868) Copyright. Avail: NTIS HC $30.00/MF $30.00 CSCL 11F

These citations discuss the deterioration, or failure, of metals at low temperatures. Aluminum is not included, as it is the subject of a separate retrospective bibliography. Cryogenic operations, superconductors, aircraft, arctic facilities and other forms of exposure of metals to extreme cold, are included. Failure mechanisms, dynamics, and inhibitors or retardants, are described. Contains 104 citations. GRA

27 NONMETALLIC MATERIALS

Includes physical, chemical, and mechanical properties of plastics, elastomers, lubricants, polymers, textiles, adhesives, and ceramic materials.

N81-14076* National Aeronautics and Space Administration. Pasadena Office, Calif.
MEMBRANE CONSISTING OF POLYQUATERNARY AMINE ION EXCHANGE POLYMER NETWORK INTERPENETRATING THE CHAINS OF THERMOPLASTIC MATRIX POLYMER Patent
Alan Rembaum (JPL, California Inst. of Tech., Pasadena) and Carl J. Wallace, inventors (to NASA) (JPL, California Inst. of Tech., Pasadena) Issued 10 Oct. 1978 11 p Filed 23 Feb. 1977 Sponsored by NASA
(NASA-Case-NPO-14001-1; US-Patent-4,119,581; US-Patent-Appl-SN-771245; US-Patent-Class-521-27;

US-Patent-Class-210-24R; US-Patent-Class-260-2.1E; US-Patent-Class-260-17A; US-patent-Class-260-858; US-Patent-Class-260-886; US-Patent-Class-260-895; US-Patent-Class-260-898; US-Patent-Class-260-8900 US-Patent-Class-260-901; US-Patent-Class-521-62, US-Patent-Class-521-32) Avail: US Patent and Trademark Office CSCL 07D

An ion exchange membrane was formed from a solution containing dissolved matrix polymer and a set of monomers which are capable of reacting to form a polyquaternary ion exchange material; for example vinyl pyride and a dihalo hydrocarbon. After casting solution and evaporation of the volatile component's, a relatively strong ion exchange membrane was obtained which is capable of removing anions, such as nitrate or chromate from water. The ion exchange polymer forms an interpenetrating network with the chains of the matrix polymer.

Official Gazette of the U.S. Patent and Trademark Office

N81-14077* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.

SURFACE FINISHING Patent

Jack A. Kinzler, James T. Hefferman, Leroy G. Fehrenkamp, and William S. Lee, inventors (to NASA) Issued 30 Sep. 1980 8 p Filed 25 Jan. 1979 Supersedes N79-21183 (17-12, p 1540) Continuation of abandoned US Patent Appl. SN-785279, filed 6 Apr. 1977 which is a division of US Patent Appl. SN-568541, US Patent-4, 032, 089, filed 16 Apr. 1975 (NASA-Case-MSC-12631-3; US-Patent-4,225,372; US-Patent-Appl-SN-006952; US-Patent-Class-156-154; US-Patent-Class-156-160; US-Patent-Class-156-163; US-Patent-Class-156-212; US-Patent-Class-156-267; US-Patent-Class-156-295; US-Patent-Class-156-323; US-Patent-Class-156-331; US-Patent-Appl-SN-785279; US-Patent-Appl-SN-568541; US-Patent-4,032,089) Avail: US Patent and Trademark Office CSCL 11A

A surface of an article adapted for relative motion with a fluid environment is finished by coating the surface with a fluid adhesive, covering the adhesive with a sheet of flexible film material under tension on the film material whereby the tensioned film material is bonded to the surface by the adhesive.

Official Gazette of the U.S. Patent and Trademark Office

N81-14078* National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

METHOD FOR PREPARING ADDITION TYPE POLYIMIDE PREPREGS Patent

Terry L. St.Clair, inventor (to NASA) Issued 11 Nov. 1980 5 p Filed 13 Feb. 1979 Supersedes N79-19160 (17-10, p 1257) Division of US Patent Appl. SN-839963, filed 6 Oct. 1977, US Patent-4, 166, 170 (NASA-Case-LAR-12054-2; US-Patent-4,233,258; US-Patent-Appl-SN-011737; US-Patent-Class-264-137; US-Patent-Class-427-429; US-Patent-Class-427-385.5; US-Patent-Class-428-473.5; US-Patent-4,166,170; US-Patent-Appl-SN-839963) Avail: US Patent and Trademark Office CSCL 07C

A novel addition polyimide based on the use of liquid monomers wherein the essentially solventless prepreg produced therefrom retains good drape, tack and other mechanical properties.

Official Gazette of the U.S. Patent and Trademark Office

N81-14079*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

CHANGES IN SURFACE CHEMISTRY OF SILICON CARBIDE (0001) SURFACE WITH TEMPERATURE AND THEIR EFFECT ON FRICTION

Kazuhisa Miyoshi and Donald H. Buckley Nov. 1980 12 p refs (NASA-TP-1756; E-475) Avail: NTIS HC A02/MF A01 CSCL 07D

Friction studies were conducted with a silicon carbide (0001) surface contacting polycrystalline iron. The surface of silicon carbide was pretreated: (1) by bombarding it with argon ions for 30 minutes at a pressure of 1.3 pascals; (2) by heating it at 800 C for 3 hours in vacuum at a pressure of 10 to the minus eighth power pascal; or (3) by heating it at 1500 C for 3 hours in a vacuum of 10 to the minus eighth power pascal. Auger emission spectroscopy was used to determine the presence of silicon and carbon and the form of the carbon. The surfaces of silicon carbide bombarded with argon ions or preheated to 800 C revealed the main Si peak and a carbide type of C peak in the Auger spectra. The surfaces preheated to 1500 C revealed only a graphite type of C peak in the Auger spectra, and the Si peak had diminished to a barely perceptible amount. The surfaces of silicon carbide preheated to 800 C gave a 1.5 to 3 times higher coefficient of friction than did the surfaces of silicon carbide preheated to 1500 C. The coefficient of friction was lower in the <11(-2)0> direction than in the <10(-1)0> direction; that is, it was lower in the preferred crystallographic slip direction.

Author

N81-14080*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

CROSSLINKING OF AROMATIC POLYAMIDES VIA PENDANT PROPARGYL GROUPS

Anne K. St.Clair, Terry L. St.Clair, John D. Barrick, and Francis J. Campbell (NRL, Washington, D.C.) Dec. 1980 17 p refs Presented at 1980 Southeast-Southwest Regional Meeting of the Am. Chem. Soc. New Orleans, 10-13 Dec. 1980 (NASA-TM-81918) Avail: NTIS HC A02/MF A01 CSCL 07C

Methods for crosslinking N-methyl substituted aromatic polyamides were investigated in an effort to improve the applicability of these polymers as matrix resins for Kevlar trademark fiber composites. High molecular weight polymers were prepared from isophthaloyl dichloride and 4,4'- bis(methylamino) diphenylmethane with varying proportions of the N,N'bispropargyl diamine incorporated as a crosslinking agent. The propargyl containing diamines were crosslinked thermally and characterized by infrared spectroscopy, differential scanning calorimetry, and thermogravimetric analysis. Attempts were also made to crosslink polyamide films by exposure to ultraviolet light, electron beam, and gamma radiation.

Author

N81-14081*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

ADDITION POLYIMIDE END CAP STUDY

Terry L. St.Clair Nov. 1980 16 p refs (NASA-TM-81917) Avail: NTIS HC A02/MF A01

The characterization of addition polyimides with various end caps for adhesive applications at 120-250 C environments is discussed. Oligometric polyimides were prepared from 3,3',4,4'-benzophenone tetracarboxylic dianhydride and 3,3'-methylenedianiline which were end-capped with functionally reactive moities which cause crosslinking when the oligomers are heated to 200-400 C. The syntheses of the oligomers are outlined. The thermolysis of the oligomers was studied by differential scanning calorimetry and the resulting polymers were characterized by differential thermal analysis and adhesive performance. The adhesive data include lap shear strengths on titanium 6-4 adherends both before and after aging for 1000 hours at 121 C and/or 232 C.

M.G.

N81-14082*# General Electric Co., Philadelphia, Pa. Advanced Energy Programs Dept.

IMPROVED CERAMIC HEAT EXCHANGER MATERIALS Final Report

Harry W. Rauch Dec. 1980 39 p refs (Contracts NAS3-19698 EC-77-A-31-1011; DE-AI01-77CS-51040) (NASA-CR-159678; DOE/NASA/9698-2) Avail: NTIS HC A03/MF A01 CSCL 07C

The development and evaluation of materials for potential application as heat exchanger structures in automotive gas turbine engines is discussed. Test specimens in the form of small monolithic bars were evaluated for thermal expansion and dimensional stability before and after exposure to sea salt and sulfuric acid, followed by short and long term cycling at temperatures up to 1200 C. The material finally selected, GE-7808, consists of the oxides, ZrO2-MgO-Al2O3-S1O2, and is described generically as ZrMAS. The original version was based on a commercially available cordierite (MAS) frit. However, a clay/talc mixture was demonstrated to be a satisfactory very low cost source of the cordierite (MAS) phase. Several full size honeycomb regenerator cores, about 10.2 cm thick and 55 cm diameter

were fabricated from both the frit and mineral versions of GE-7808. The honeycomb cells in these cores had rectangular dimensions of about 0.5 mm x 2.5 mm and a wall thickness of approximately 0.2 mm. The test data show that GE-7808 is significantly more stable at 1100 C in the presence of sodium than the aluminosilicate reference materials. In addition, thermal exposure up to 1100 C, with and without sodium present, results in essentially no change in thermal expansion of GE-7808. M.G.

N81-14083# Centro Informazioni Studi Esperienze, Milan (Italy).
QUASI ELASTIC LIGHT SCATTERING FROM MACROMOLECULES IN SOLUTION
M. Giglio Dec. 1979 19 p refs Presented at NATO Advan. Study Inst. Lasers in Biol. and Med., Le Pianore (Lucca), Italy, 19-31 Aug. 1979
(Contract CNR/CISE-78-00901.02)
(CISE-1528) Avail: NTIS HC A02/MF A01

The spectrum and autocorrelation function of the scattered field was calculated. The formular for the spectrum and autocorrelation of the intensity of the scattered radiation and of the photocurrent out of the photodetector are presented. The signal to noise ratio for the measurement of the spectrum and autocorrelation of the photocurrent are discussed. T.M.

N81-14084# Naval Weapons Center, China Lake, Calif.
VANADIUM TRINEODECANOATE PROMOTER FOR FIBERGLASS-POLYESTER SOIL SURFACINGS Final Report, Apr. 1979 - Mar. 1980
Alan L. Woodman, Ronald A. Henry, Arnold Adicoff, and Dwight A. Fine Jun. 1980 30 p refs
(AD-A091785; AD-E900008; NWC-TP-6184) Avail: NTIS HC A03/MF A01 CSCL 11/2

A Marine Corps chemical formulation developed for the construction of fiberglass-reinforced plastic surfaces for soils consists of a polyester resin, cumene hydroperoxide catalyst and a promoter solution containing a vanadium salt and N,N-dimethyl-p-toluidine. A new, relatively simple method for preparing the vanadium trineodecanoate (VND) solution has been devised to replace the previously used commercial salt solution which is no longer being manufactured. This preparation is now ready to be scaled-up to pilot plant size. Reactivity and accelerated aging studies indicate that the VND solution functions at least as well as the commercial salt. Laminates made under either dry or wet conditions with the VND displayed significantly higher flexural strengths than those made with the commercial material. GRA

N81-14085# Texas A&M Univ., College Station. Dept. of Chemistry.
POLYMER ACTIVATED CATALYSTS Interim Technical Report
D. E. Bergbreiter, M. S. Bursten, T. J. Lynch, and G. L. Parsons 1 Nov. 1980 34 p refs
(Contract N00014-77-C-0426)
(AD-A091750; TR-7) Avail: NTIS HC A03/MF A01 CSCL 11/9

Three different ways in which functionalized polymers can activate hydrogenation catalysts will be discussed. In the first example, a sulfonated divinylbenzene-crosslinked polystyrene is converted to a silver(I) salt. This silver(I) containing polymer selectively absorbs triphenylphosphine from solution in the presence of transition metal complexes. As a result of this removal of nonvolatile phosphine ligand, the activity of conventional homogeneous hydrogenation catalysts such as ((C6H5)3P)3RhC1 or ((C6H5)3Rh(CO)H can be increased in cases where excess free ligand is known to lower catalytic activity. In a second example of polymer activation of hydrogenation catalysts we have shown that the hydrogenation activity of polystyrene supported bis(cyclopentadienyl)titanium dichloride is significantly altered when organomagnesium reagents instead of organolithium reagents are used to prepare an active catalyst. Rates of olefin isomerization of terminal alkenes to trans-2-alkenes and hydrogenation of terminal alkenes both are must faster with the organomagnesium reduced catalysts. Finally, transition metal complexes can be directly deposited on organometallic polymers to yield polymer supported heterogeneous catalysts whose activity in hydrogenation of terminal alkenes is comparable to that of catalysts supported on inorganic materials. GRA

N81-14086# Alabama Univ. in Huntsville. Dept. of Industrial and Systems Engineering.
TEMPERATURE SENSITIVE DYNAMIC CUSHIONING FUNCTION DEVELOPMENT AND VALIDATION FOR AIRCAP CELLULAR POLYETHYLENE Final Report, 1 Oct. 1979 - 30 Sep. 1980
Richard M. Wyskida and James D. Johannes Sep. 1980 195 p refs
(Contract DAAK40-78-C-0146)
(AD-A091604; UAH-RR-257; DRSMI/RL-CR-80-5) Avail: NTIS HC A09/MF A01 CSCL 11/9

This report describes the development of cushioning models for the AIRCAP cushioning material. The development models have been statistically validated and are available for use on the HP-9815A desktop calculator, or on a FORTRAN language computer. The temperature range of applicability is 32 F to 160 F and a static stress range of 0.03 to 0.80 psi. GRA

N81-14087# Rockwell International Corp., Anaheim, Calif. Electronic Devices Div.
VERIFICATION OF SELECTED SOLVENT SOLUBLE COATINGS USING PRODUCTION HYBRID MICROCIRCUITS Final Technical Report, 16 Jan. 1979 - 15 Jan. 1980
B. L. Weigand and J. J. Licari Wright-Patterson AFB, Ohio AFWAL May 1980 76 p refs
(Contract F33615-79-C-5011)
(AD-A091554; C79-302/501; AFWAL-TR-80-4048) Avail: NTIS HC A05/MF A01 CSCL 11/3

The objective of this program was to develop the material and process data necessary for qualification, acceptance, processing and control of selected solvent soluble coatings for particle immobilization in monolithic and hybrid microcircuits. These coatings are removable by a 'hands off' procedure simplifying and reducing the costs of rework encountered with nonsoluble coatings. Qualification testing included a screen test and operating life test sequence using coated production hybrid microcircuits (32 microcircuits/coating) comparable to that required for MIL-STD-883 Class B microcircuits. Based on the results of the data obtained, material and process specifications were prepared covering two types of coating materials. The Type I material covers block copolymers of dimethylsiloxane and alpha-methylstyrene. The Type II material is a block copolymer of vinylidene fluoride and chlorotrifluoroethylene. GRA

N81-14088# California Univ., Los Angeles.
ELECTROCHROMIC GLASSES Final Report, 1 Sep. 1976 - 31 Jul. 1980
Rubin Braunstein 31 Jul. 1980 85 p refs
(Grants DAAG29-76-G-0321; DAAG29-79-G-0047)
(AD-A091641; ARO-14249.14-P) Avail: NTIS HC A05/MF A01 CSCL 11/2

The series of Li2O-B2O3 Na2O-B2O3-WO3 and TeO2-WO3 glasses were prepared which exhibit the phenomena of electrochromic, photochromic and cooperative behavior of random electric dipoles in an amorphous matrix. The techniques of thermally stimulated depolarization currents were used to measure the relaxation time, dipole moment and activation energy of dipole species in these glasses. Wavelength modulation and Rayleigh-Brillouin scattering techniques were employed to study the optical properties of these glasses. GRA

N81-14089# University of Southern Mississippi, Hattiesburg.
IMPROVED POLYMERS FOR ENHANCED OIL RECOVERY SYNTHESIS AND RHEOLOGY
Jun. 1980 253 p refs
(Contract EF-77-S-05-5603)
(DOE/BETC-5603/10) Avail: NTIS HC A12/MF A01

The effects of macromolecular structure on aqueous rheological behavior were studied. Simple, yet effective screening tests were developed to project performance under field conditions. Random- and graft-copolymers served as models for use as mobility control agents in enhanced oil recovery. T.M.

N81-14090# Maryland Univ., College Park.
RADIATION-INDUCED CROSSLINKING AND GRAFTING REACTIONS IN POLYETHYLENE Ph.D. Thesis
Walter J. Chappas 1979 112 p refs
(DOE/ER-02845/T1) Avail: NTIS HC A06/MF A01

Three aspects of the crosslinking and grafting reactions induced by ionizing radiation were studied. The effect of trace inert fillers on the radiation induced crosslinking of polyethylene was experimentally investigated. Results do not substantiate the enhancement of the radiation crosslinking of polyethylene said to be associated with the addition of small amounts of inert filler. Experiments were performed using polyethylene films immersed in styrene-methanol solutions both with and without acid and oxygen. Radiation induced grafting reactions sensitized by acid were observed. Finally, the radiation chemistry of The crystalline region of polyethylene was studied. Experiments were performed with a Varian 5402 ESR spectrometer on single crystals of a model compound which resembles the crystalline region of linear polyethylene. The relative yields of he alkyl radicals produced in the irradiated single crystals were found to be dependent upon experimental conditions, particularly dose, temperature, and time. Radical migration to defective crystalline regions was found to be by both inter and intramolecular motion. J.M.S.

N81-14091# Case Western Reserve Univ., Cleveland, Ohio. Dept. of Metallurgy and Materials Science.
PLASTIC DEFORMATION IN OXIDE CERAMICS Progress Report, 1 Jan. - 31 Dec. 1980
A. H. Heuer Sep. 1980 50 p refs
(Contract EG-77-S-02-4217)
(DOE/ER-04217/T1; COO-4217-5) Avail: NTIS HC A03/MF A01

The effects of O/U ratio on UO2 single crystals oriented either to suppress or promote slip are described. For both orientations, a change from crystallographic to noncrystallographic slip is observed with composition and temperature and correlated with the presence of Willis defects. Research on the kinetics and mechanism of formation of crystallographic shear (CS) planes in reduced rutile is also described. Two orientations of CS planes are present, although prior work had suggested that only one orientation would be present for the particular value of x studied. In situ reductions in the environmental stage of the HVEM were also begun. Author

N81-14092# Solar Turbines International, San Diego, Calif.
JOINING OF CERAMICS FOR HIGH PERFORMANCE ENERGY SYSTEMS Mid-Term Progress Report, 1 Aug. 1979 - 31 Mar. 1980
Charles E. Smeltzer and Arthur. G. Metcalfe 1 Oct. 1980 39 p refs
(Contract DE-AC05-79ET-15359)
(DOE/ET-15359/1; SR80-R-4981-04) Avail: NTIS HC A03/MF A01

The use of silicate glass-based adhesives for bonding silicon base refractory ceramics was examined. Work in each of the five program tasks was reviewed. The five tasks are long term joint stability, environmental and service effects on joint reliability, viscoelastic damping of glass bonded ceramics, crack arrest and crack diversion by joints, and improved joining and fabrication methods. T.M.

N81-14093# United Merchants Research Center, Langley, S.C.
APPLICATION OF FOAMS TO THE PROCESSING OF FABRICS, PHASE 3 Technical Progress Report, 1 Sep. 1979 - 31 Aug. 1980
Chettoor G. Namboodri Sep. 1980 33 p
(Contract DE-AC02-77CS-40056)
(DOE/CS-40056/T2) Avail: NTIS HC A03/MF A01

Results of evaluations of various application techniques to produce commercially acceptable dyeings are cited. Foam dyeing of nylon carpets, nylon flock fabric dyeing, and foam dyeing of 100% polyester blankets utilizing pigment foam and disperse dye foam are among the subjects discussed. Development of applicators to apply dye and finish uniformly to flat goods is reported along with simultaneous tinting and foam finishing by the use of a tripad. Feasibility of wet on wet foam dyeing of prepared wet fabrics is indicated. Foam pigment dyeing of flat goods by horizontal pad application, foam printing using engraved rolls and the utilization of foams in fabric preparation are considered. J.M.S.

N81-14094# General Atomic Co., San Diego, Calif.
STRENGTH AND FRACTURE CHARACTERISTICS OF HTGR THERMAL BARRIER CERAMICS
J. E. Sheehan and J. F. Holzgraf Aug. 1980 126 p refs
(Contract DE-AT03-76ET-35300)
(GA-A-15929) Avail: NTIS HC A07/MF A01

The design of core support pads and cover blocks for the high temperature gas cooled reactor (HTGR) requires a detailed knowledge of the structural integrity of commercial ceramics. The baseline strengths and fractography of candidate Al2O3, Si3N4, and fused SiO2 materials were examined. Diametral compressive and four point bend strengths were determined between 20 to 1200 C in dry helium. Chemistry, microstructure, and fracture surfaces were correlated with the mechanical behavior. DOE

N81-14095# National Bureau of Standards, Washington, D.C. National Measurement Lab.
APPLICATION OF FRACTURE MECHANICS IN ASSURING AGAINST FATIGUE FAILURE OF CERAMIC COMPONENTS
J. E. Ritter, Jr., S. M. Wiederhorn, N. J. Tighe, and E. R. Fuller, Jr. Jun. 1980 35 p refs Prepared in cooperation with Massachusetts Univ., Amherst; sponsored in part by DOE, Washington, D.C. and Office of Naval Research
(PB80-213549; NBSIR-80-2047) Avail: NTIS HC A03/MF A01 CSCL 11B

The application of fracture mechanics theory to the prevention of delayed failure of ceramics is reviewed. Three successful applications of this theory of assuring the mechanical reliability of ceramics are discussed in order to demonstrate the viability of the theory for purposes of engineering design. Finally, a description is presented of practical limitations of the theory with regard to heat engine application. Methods of overcoming these limitations through modification of test procedures, and application of statistical theory are then presented. GRA

N81-14096# National Technical Information Service, Springfield, Va.
HIGH TEMPERATURE LUBRICANTS AND OILS. CITATIONS FROM THE ENGINEERING INDEX DATA BASE Progress Report, 1979 - Aug. 1980
Diane M. Cavagnaro Sep. 1980 72 p Supersedes NTIS/PS-79/1032; NTIS/PS-78/0948
(PB80-815590; NTIS/PS-79/1032; NTIS/PS-78/0948) Avail: NTIS HC $30.00/MF $30.00 CSCL 11H

Citations from worldwide research are presented. The properties, uses, composition, performance, and wearing ability of hydraulic fluids, oils, greases, and solid lubricants are discussed. GRA

N81-14097# National Technical Information Service, Springfield, Va.
HIGH TEMPERATURE LUBRICANTS AND OILS. CITATIONS FROM THE NTIS DATA BASE Progress Report, 1977 - Aug. 1980
Diane M. Cavagnaro Sep. 1980 161 p Supersedes NTIS/PS-79/1034; NTIS/PS-78/0947
(PB80-815582; NTIS/PS-79/1034; NTIS/PS-78/0947) Avail: NTIS HC $30.00/MF $30.00 CSCL 11H

Citations from Federally funded research on the composition, properties, testing, and use of high-temperature lubricants, oils, and hydraulic fluids are presented. Also included are greases, solid lubricants, and self-lubricating materials that were tested at high temperature. GRA

N81-14098# National Technical Information Service, Springfield, Va.
HIGH TEMPERATURE LUBRICANTS AND OILS. CITATIONS FROM THE ENGINEERING INDEX DATA BASE Progress Report, 1975 - 1978
Diane M. Cavagnaro Sep. 1980 208 p
(PB80-815574) Avail: NTIS HC $30.00/MF $30.00 CSCL 11H

Reports from worldwide research are cited. The properties, uses, composition, performance, and wearing ability of hydraulic fluids, oil, greases, and solid lubricants are covered. GRA

N81-14099# National Technical Information Service, Springfield, Va.
SOLID LUBRICANTS. CITATIONS FROM THE AMERICAN PETROLEUM INSTITUTE DATA BASE Progress Report, 1971 - Jun. 1980
William E. Reed Oct. 1980 215 p Supersedes NTIS/PS-79/0856; NTIS/PS-78/0819
(PB80-816010; NTIS/PS-79/0856; NTIS/PS-78/0819) Avail: NTIS HC $30.00/MF $30.00 CSCL 11H

Research reports are cited which cover preparation, applications, properties, and testing of solid lubricants. Molybdenum disulfide, polymer films, and graphite fluoride are but a few of the materials covered. GRA

N81-14100# National Technical Information Service, Springfield, Va.
SOLID LUBRICANTS. CITATIONS FROM THE NTIS DATA BASE Progress Report, 1964 - Jun. 1980
William E. Reed Sep. 1980 253 p Supersedes NTIS/PS-79/0853; NTIS/PS-78/0816
(PB80-815665; NTIS/PS-79/0853; NTIS/PS-78/0816) Avail: NTIS HC $30.00/MF $30.00 CSCL 11H

Research covers the preparation, applications, properties, and testing of solid lubricants. Molybdenum disulfide, polymer films, and graphite fluoride are but a few of the materials covered. GRA

N81-14101# National Technical Information Service, Springfield, Va.
SOLID LUBRICANTS: GRAPHITE, POLYMERS, FLUORIDES, AND GENERAL STUDIES. CITATIONS FROM THE ENGINEERING INDEX DATA BASE Progress Report, 1970 - Sep. 1980
William E. Reed Sep. 1980 243 p Supersedes NTIS/PS-79/0855 and NTIS/PS-78/0818
(PB80-815673; NTIS/PS-79/0855; NTIS/PS-78/0818) Copyright. Avail: NTIS HC $30.00/MF $30.00 CSCL 11H

The preparation, applications, properties, and testing of solid lubricants are discussed in approximately 234 citations, including bearings, gears, metal forming and cutting, and high and low temperature usage. Author

N81-14102# National Technical Information Service, Springfield, Va.
SOLID LUBRICANTS: MOLYBDENUM COMPOUNDS. CITATIONS FROM THE ENGINEERING INDEX DATA BASE Progress Report, 1970 - Jun. 1980
William E. Reed Sep. 1980 227 p Supersedes NTIS/PS-79/0854 and NTIS/PS078/0817
(PB80-815681; NTIS/PS-79/0854; NTIS/PS-78/0817) Copyright. Avail: NTIS HC $30.00/MF $30.00 CSCL 11H

The preparation, applications, properties, and testing of molybdenum compound solid lubricants are discussed in approximately 218 citations. Discussions of applications in the metal working, aerospace, and automotive industries are included. GRA

N81-14159*# Aerospace Corp., El Segundo, Calif.
WATER-DEUTERIUM OXIDE EXCHANGE IN POLYMERS USED IN SPACECRAFT APPLICATIONS
D. J. Carre *In* NASA. Johnson Space Center The 11th Space Simulation Conf. 1980 p 269-279 refs (For primary document see N81-14138 05-31)
(Contract F04701-79-C-0080)
Avail: NTIS HC A19/MF A01 CSCL 07C

28 PROPELLANTS AND FUELS

Includes rocket propellants, igniters, and oxidizers, storage and handling; and aircraft fuels.

For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power,* and *44 Energy Production and Conversion.*

N81-14103* National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
ATOMIC HYDROGEN STORAGE METHOD AND APPARATUS Patent
John A. Woollam, inventor (to NASA) Issued 21 Oct. 1980 4 p Filed 6 Feb. 1979 Supersedes N79-18455 (17-09, p 1157) Division of US Patent Appl. SN-837794, filed 29 Sep. 1977, US Patent-4,193, 827, which is a division of US Patent Appl. SN-676432, filed 13 Apr. 1976, US Patent-4, 077, 788
(NASA-Case-LEW-12081-3; US-Patent-4,229,196;
US-Patent-4,193,827; US-Patent-4,077,788;
US-Patent-Appl-SN-009887; US-Patent-Appl-SN-837794;
US-Patent-Appl-SN-676432; US-Patent-Class-62-40;
US-Patent-Class-62-47; US-Patent-Class-62-18;
US-Patent-Class-62-12; US-Patent-Class-55-2;
US-Patent-Class-423-648R; US-Patent-Class-156-344;
US-Patent-Class-149-1; US-Patent-Class-44-7R) Avail: US Patent and Trademark Office CSCL 21D

Atomic hydrogen, for use as a fuel or as an explosive, is stored in the presence of a strong magnetic field in exfoliated layered compounds such as molybdenum disulfide or an elemental layer material such as graphite. The compounds maintained at liquid helium temperatures and the atomic hydrogen is collected on the surfaces of the layered compound which are exposed during delamination (exfoliation). The strong magnetic field and the low temperature combine to prevent the atoms of hydrogen from recombining to form molecules.
Official Gazette of the U.S. Patent and Trademark Office

N81-14104# Technische Hogeschool, Delft (Netherlands). Dept. of Aerospace Engineering.
DERIVATION OF THE SOLID PROPELLANT RESPONSE FUNCTION
H. F. R. Schoeyer Mar. 1980 70 p refs
(VTH-M-366) Avail: NTIS HC A04/MF A01

The propellant response function is discussed. The effect of small pressure fluctuations on the burning rate of solid propellants is analyzed, assuming an arrhenius type surface pyrolysis and a homogeneous propellant. Expressions are derived for the variations of the propellant temperature for a given burning rate variation. An analytic expression for the propellant response function is derived and it is shown that, depending on parameter values, the real part of the response function may have two roots while the imaginary part of the response function only has one root. The location of these roots is investigated. S.F.

N81-14105# Nobel's Explosives Co. Ltd., Stevenston (England). Research and Development Dept.
ON THE IMPROVEMENT OF MINIATURE PYROTECHNIC DEVICES FOR SPACE APPLICATION Final Report
L. E. Medlock, W. H. Dalgleish, A. G. King, and R. Woomble Paris ESA [1980] 102 p
(Contract ESTEC-2578/75-PP(SC))
(ESA-CR(P)-1296) Avail: NTIS HC A06/MF A01

Two basic actuators were designed, the bellows and the piston, which, having a size similar to or less than those available at that time, withstood temperatures up to 150 C and had work outputs considerably in excess of the then current designs. Additional requirements were that there be virtually no escapes of gas on operation, that they should be demonstrably hermetically sealed and that they should have a long storage life. In order that their cost might be reasonably low, emphasis was placed on the use readily available commericial components wherever possible. Improvements included the substitution of the standard electrical leads by screened lead approved for space application. T.M.

N81-14106# Nobel's Explosives Co. Ltd., Stevenston (England). Propellants Research and Development Section.
CODIFICATION OF THE HIGH-TEMPERATURE PROPELLANT TRHA
J. H. Phillipson Paris ESA 25 Jul. 1980 44 p
(Contract ESTEC-4113/79-NL-AK(SC))
(ESA-CR(P)-1374-Vol-1) Avail: NTIS HC A03/MF A01

The processing procedure for the manufacture of the temperature resistant propellant TRHA was standardized. Five Pilot Batches of propellant were manufactured in two standard grain sizes to prove the procedures and in particular to determine performance limits for acceptance criteria. A documentation set which forms the comprehensive processing procedure was prepared. All aspects of the manufacture, testing, release and

dispatch of TRHA propellant emphasizing quality control features were defined. After approval of the documentation set a qualification batch was manufactured and tested in the two standard grain sizes codified, in accordance with the prepared procedures. R.C.T.

N81-14107# Princeton Univ., N. J. Dept. of Mechanical and Aerospace Engineering.

CONVECTIVE IGNITION OF PROPELLANT CYLINDERS IN A DEVELOPING CROSS-FLOW FIELD Ph.D. Thesis Final Report

Aviezer Birk and Leonard H. Caveny Sep. 1980 194 p refs (Contract DAAG29-79-C-0140; Grants DAAG29-78-G-0153; DAAG29-76-G-0049; DAAG29-76-C-0270) (AD-A091852; MAE-1486; ARO-15994.2-E; ARO-13108.1-E; ARO-14200.1-E) Avail: NTIS HC A09/MF A01 CSCL 19/1

The sensitivities of ignition delay time and site to the ambient conditions (i.e., flow velocity, pressure, temperature and gas composition) were investigated under high heat flux conditions (e.g., 100 cal/cm2-s). A shock tunnel was used to provide up to 20 ms of flowing heated gas at: 1 to 22 mpa, 1800 to 2300 k, 5 to 300 m/s. Test gases were 100%N2,10%O2/90%N2 and 50%O2/50%N2. Instrumentation included radiation detectors, high-speed shadowgraph sequences, pressure probes and heat flux gauges. Most of the tests were conducted with nitrocellulose-based propellants. The effect of high heating rates accompanying the initial flow transients and boundary layer development were very prominent in producing sub-millisecond ignition delays for oxygen-containing flows. Indeed, during their brief period (on the order of 0.2 ms) the heat fluxes are 4 to 5 times higher than corresponding well developed flow values. Flame blow-off occurred for high Reynolds numbers (e.g., 16,000), low free stream oxygen content flows. Depending on the flow conditions, first ignition occurred distinctly at the leading edge, trailing edge or at the flow separation region. Compared to triple-based propellant, single-based and double-based propellants ignited more rapidly in oxygen-containing flows. The experimental results indicate clearly that for the range of ambient conditions tested, the ignition is a gas phase process. The ignition processes in nonsteady reactive boundary layer flows were analyzed for the front stagnation flow region. The solution includes the boundary layer development and the transition and quasi-steady burning. GRA

N81-14108# Georgia Inst. of Tech., Atlanta. School of Aerospace Engineering.

COMBUSTION MECHANISMS OF SOLID PROPELLANTS Final Technical Report, 1 Dec. 1976 - 31 Jul. 1979

E. W. Price, J. C. Handley, W. C. Strahle, T. S. Sheshadri, R. K. Sigman, and Ashoke Ghosh 1 Sep. 1980 123 p refs (Contract N00014-75-C-0332) (AD-A091857) Avail: NTIS HC A06/MF A01 CSCL 21/9

A summary report is made of research on the latter phases of this contract, involving mechanisms of propellant combustion. In eight sections, work on the following is reported: (1) Status of understanding; (2) Decomposition of binders as revealed by hot stage microscope studies; (3) Systematic studies of combustion of 'sandwiches' of binder laminae between ammonium perchlorate laminae, with particular emphasis on quench-burning of thin-binder sandwiches; (4) Exploratory tests of combustion of other geometrically simple structures chosen to simulate other aspects of combustion of real propellants; (5) Systematic tests of a family of propellants to provide comparisons with results of tests on ordered structures; (6) Development of a new analytical model for burning rate of propellants, based on the idea of determining the least-time-path for burning front to propagate through the microstructure from the burning surface to some relatively distant point in the propellant; (7) Development of a transient analysis of an axially symmetrical diffusion flame analogous to a burning oxidizer particle in a propellant matrix, and demonstration that the steady-state solution to this 'Burke-Schumann'-like problem is not dynamically stable (the complete analysis will be published separately); and (8) A restatement of the initial approach to the statistical model of propellant developed by Glick and Condon (presented to clarify the assumptions and method of the statistical approach). GRA

N81-14109# Ogden Air Logistics Center, Hill AFB, Utah. Propellant Analysis Lab.

PROPELLANT SURVEILLANCE REPORT, LGM-30 F AND G STAGE 1 PHASE G, SERIES 1 TP-H1011 Semiannual Test Results Report

John A. Thompson Oct. 1980 134 p (AD-A091765; MAKPH-445(80)) Avail: NTIS HC A07/MF A01 CSCL 21/9

This report contains propellant test results from cartons of TP-H1011 bulk propellant representing LGM-30 F and G First Stage Minuteman Motors. This report uses a statistical approach to analyze the bulk carton propellant data. Testing was accomplished in accordance with MMWRM Project M04046- WNL01529. The data from this test period are combined with data from previous testing and entered into the G085 computer for storage, analysis and regression analysis. From the statistical analysis of all data tested to date (fourteen 1/2 years for F and G), significant degradation of the propellant does not appear likely for at least two years past the oldest data point. Each point on the regression plot represents the mean of all samples at that particular age. The number of samples at each point is indicated on the sample size summary sheet on the page accompanying each regression plot or group of regression plots. The data range at any age can be found by suitable inquiry of the G085 system. GRA

N81-14110# Ogden Air Logistics Center, Hill AFB, Utah. Propellant Analysis Lab.

STAGE 1 PROPELLANT, SURVEILLANCE REPORT GLACIAL ACRYLIC ACID, MOTORS GAA-001 AND GAA-002, TP-H1011 Annual Test Results Report

John A. Thompson May 1980 54 p (AD-A091707; MAKPH-441(80)) Avail: NTIS HC A04/MF A01 CSCL 21/9

Thiokol Minuteman First Stage Propellant uses acrylic acid to produce the HB polymer used as the binder. The original supplier of acrylic acid stopped production and Thiokol then obtained acrylic acid produced by the Taft, Louisiana Plant of Union Carbide Company. To assure that this new source of supply was a satisfactory replacement, Thiokol ran qualifications testing on the new material and found it satisfactory. In the Thiokol program two motors were cast in 1971 and propellant from the mixes were cast into cartons for a ten year test program. This propellant was then transferred to this laboratory and testing on a yearly basis was started in 1975. From an analysis of the data the propellant's physical properties are satisfactory and the stability, with respect to age, is satisfactory. GRA

N81-14111# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.

AN EXPERIMENTAL STUDY OF METHANOL REFORMATION M.S. Thesis - Arizona Univ.

John Bradford Shafer Dec. 1979 111 p refs (AD-A091412; AFIT-CI-79-240T) Avail: NTIS HC A06/MF A01 CSCL 07/3

Transportation vehicles: overall efficiency could be greatly increased if a hydrogen-air fuel cell served as the power source. Carrying hydrogen on board a vehicle presents immense weight and safety problems, however, and the fuel cell vehicle has so far been successful only in space or research study. Reforming of a source fuel into a hydrogen-rich gas offers a solution to the problems, especially if waste heat from the fuel cell can be used in the reforming. This paper discusses the ideas behind fuel cell vehicles, the choice of methanol as the source fuel and the detailed design and construction of a reformer system to test the possibilities. The reformer system is now operating at The University of Arizona, and early data has provided successful results. The system was designed to be reliable and capable of testing methanol reforming using variables of temperature, pressure, methanol to water ratio, carbon buildup, flow rate and differing catalysts. Early results predict that at temperatures of 400 F and below a larger catalyst volume may be required to produce the volume of hydrogen needed at fuel cell maximum power. Ethanol research is proposed. GRA

N81-14112# Sandia Labs., Albuquerque, N. Mex.

ELECTROTHERMAL RESPONSE TESTING OF ELECTROEXPLOSIVE DEVICES WITH ELECTRICALLY CONDUCTING

EXPLOSIVES
Olden L. Burchett and Arnold C. Strasburg Oct. 1980 28 p refs Sponsored by DOE
(SAND-80-0231) Avail: NTIS HC A03/MF A01

The conductive electrothermal response model for a device with an electrically conductive explosive was developed and applied to a series of carefully measured electrothermal response analogues. The electrothermal response analogues were from two different devices, one with an electrically conductive explosive and one with an electrically nonconductive explosive. Author

N81-14113# American Energy Research Co., Mclean, Va.
OPPORTUNITIES FOR COAL TO METHANOL CONVERSION
Apr. 1980 80 p refs
(Contract DE-AC01-79CS-50009)
(DOE/CS-50009/01) Avail: NTIS HC A05/MF A01

The accumulations of mining residues in the anthracite coal regions of Pennsylvania offer a unique opportunity to convert the coal content into methanol that could be utilized in that area as an alternative to gasoline or to extend the supplies through blending. Additional demand may develop through the requirements of public utility gas turbines located in that region. The delivered cost at the pump for methanol produced from coal mining wastes could range between $6.20 and $7.86 per million Btu. L.F.M.

N81-14114# Ohio State Univ., Columbus. Dept. of Chemistry.
DEVELOPMENT AND OPTIMIZATION OF METHODOLOGIES FOR ANALYSIS OF COMPLEX HYDROCARBON MIXTURES Progress Report, 1 Jan. - 31 Aug. 1980
Richard J. Laub 1980 12 p
(Contract DE-AC02-80ER-10554)
(DOE/ER-10554-T1) Avail: NTIS HC A02/MF A01

Studies designed to explore and to clarify the a priori prediction of optimum conditions for the chromatographic separation of complex mixtures of organic compounds are described. Optimization strategies with regard to open tubular columns in analytical gas chromatography are presented. Studies of various modes of liquid chromatographic fractionation and separation of complex hydrocarbon mixtures are described. A very useful fractionation methodology, termed rotating disk thin layer chromatography, was developed. T.M.

N81-14115# Pennsylvania State Univ., University Park.
GASIFICATION OF DISORDERED CARBONS (CHARS) Annual Progress Report, 1 Aug. 1979 - 31 Oct. 1980
P. L. Walker, Jr. and R. G. Jenkins Jun. 1980 72 p refs
(Contract DE-AC02-79ER-10488)
(DOE/ER-10488-1) Avail: NTIS HC A04/MF A01

It was shown that rates of gasification of chars derived from coals vary widely with the rank of coal and the gasification medium used. Variation in rates is thought to be attributable to: (1) variation in active surface area and (2) extent to which gasification is catalyzed by inorganic impurities present. Progress in research covers three areas: (1) measurement of rate constants for the adsorption step in the reaction of O2 with a high purity char at low pressures, (2) design and construction of a high pressure reactor to be used to measure rate constants for the desorption step in the reaction of O2 with carbons, and (3) development of small angle X-ray scattering to characterize both dispersion of catalysts supported on carbon and the micropore system of chars. Author

N81-14116# Pittsburgh and Midway Coal Mining Co., Shawnee Mission, Kans.
EXPLORATORY RESEARCH ON SOLVENT REFINED COAL LIQUEFACTION Quarterly Technical Progress Report, 1 Jul. - 30 Sep. 1979
Jul. 1980 56 p refs
(Contract DE-AC01-79ET-14800)
(DOE/ET-14800/11) Avail: NTIS HC A04/MF A01

In a series of experiments with varying feed gas composition, high levels (20-40 mole %) of carbon monoxide resulted in a 3 general degradation of operability and reduced oil yields from Powhatan coal (Pittsburgh Seam). Addition of finely divided pyrite to the reactive Powhatan coal had little effect on oil yields although the molecular weight of the distillation residue was apparently decreased. When finely divided pyrite and magnetite were added to the less reactive Loveridge coal (also Pittsburgh Seam), however, a substantial increase in oil yields and product quality was obtained. Author

N81-14117# Pittsburgh and Midway Coal Mining Co., Shawnee Mission, Kans.
EXPLORATORY RESEARCH ON SOLVENT REFINED COAL LIQUEFACTION Annual Technical Progress Report, 1 Jan. - 31 Dec. 1979
Sep. 1980 100 p refs
(Contract DE-AC22-79ET-14800)
(DOE/ET-14800/13) Avail: NTIS HC A05/MF A01

Process alterations and reactor performance characteristics were analyzed. In a series of experiments with varying feed gas composition, low levels (5-10 mole percent) of carbon monoxide had little effect on the SRC II processing of Pittsburgh Seam coal while higher levels (20-40 mole percent) resulted in a general degradation of operability and reduced oil yields. Addition of finely divided pyrite to the reactive Powhatan coal had little effect on oil yields although the molecular weight of the distillation residue was apparently decreased. When finely divided pyrite and magnetite were added to the less reactive coals, however, substantial increases in oil yields and product quality were obtained. In a comparison of upflow and downflow dissolver configurations with Powhatan coal in the SRC II mode, there was no difference in yields or product quality. M.G.

N81-14118# Brigham Young Univ., Provo, Utah.
INVESTIGATION OF SULFUR-TOLERANT CATALYSTS FOR SELECTIVE SYNTHESIS OF HYDROCARBON LIQUIDS FROM COAL DERIVED GASES Quarterly Technical Progress Report, 19 Mar. - 18 Jun. 1980
Calvin H. Bartholomew 10 Jul. 1980 26 p refs
(Contract DE-AC01-79ET-14809)
(DOE/ET-14809/3) Avail: NTIS HC A03/MF A01

A 15% Fe-3% K2O on SiO2 catalyst, a 15% Co-3% K2O on SiO catalyst and a 15% CoB/SiO2 catalyst were prepared. H2 and CO chemisorption uptakes were measured for the catalysts prepared to date. It was noted that calcining the iron catalysts in air before reduction in flowing H2 aided in increasing metal dispersion. Liquid and wax traps for use in the reactor system were completed as were plans for chromatographic product analysis. Author

N81-14119# Colorado School of Mines, Golden. Dept. of Chemical and Petroleum-Refining Engineering.
ENTHALPY MEASUREMENT OF COAL-DERIVED LIQUIDS Quarterly Technical Progress Report, Oct. 1979 - Mar. 1980
A. J. Kidnay and V. F. Yesavage 15 Sep. 1980 103 p refs
(Contract DE-AC22-79ET-13395)
(DOE/ET-13395/3-4) Avail: NTIS HC A06/MF A01

A survey of the existing methods for detecting and quantifying the effect of association, owing to hydrogen-bonding, resulted in the selection of viscosity measurements and cryoscopic molecular weight determinations as the two techniques most suitable for determining the effect of association. Viscosity measurements from 70 to 190 F and at atmospheric pressure were made on 8 pure compounds and 7 coal liquids. The accuracy of the measurements was determined to be within plus or minus 5% of the measured value. Viscous enthalpies were then calculated using the above data and effective molecular weights determined. Author

N81-14120# California Univ., Berkeley. Dept. of Chemical Engineering.
PHASE-EQUILIBRIA FOR DESIGN OF COAL GASIFICATION PROCESSES. DEW POINTS OF HOT GASES CONTAINING CONDENSIBLE TARS Final Report
J. M. Prausnitz May 1980 142 p refs
(Contract EF-76-C-01-2046)
(DOE/ET-10603/T1) Avail: NTIS HC A07/MF A01

Small quantities of tar samples were fractionated in a spinning-band column. Each fraction was then chemically classified with elemental analysis and proton NMR. Based on approximate chemical classification, methods are presented for the estimation of vapor pressures and molecular weights required for predicting

tar condensation conditions. Results are presented for two tars. T.M.

N81-14121# Dynatech R/D Co., Cambridge, Mass.
LIQUID FUELS PRODUCTION FROM BIOMASS Final Report, period ending 30 Jun. 1980
P. F. Levy, J. E. Sanderson, E. Ashare, D. L. Wise, and M. S. Molyneaux 1980 157 p refs Prepared for Midwest Research Inst., Golden, Colo.
(Contract EG-77-C-02-4388)
(DOE/ET-200550/T1; Dynatech-2038) Avail: NTIS HC A08/MF A01

Conversion of just ten percent of the 300 million tons per year of agricultural residues to liquid alkane fuel can produce 800 million gallons per year of fuel, assuming 70 percent conversion of the pentose and hexose portions of the residues. This liquid alkane fuel is usable directly for blending with petroleum feedstocks or diesel fuel. No modifications are required for use in the internal combustion engine, nor are there potential market acceptance problems. The BTU content of the liquid alkane fuel produced is 60 percent greater than an equal volume of ethanol. Fermentation processes, the conversion of organic acid mixture to liquid fuels, and a process for the production of alkane fuels are discussed. Aspects covered include static fermentations, chemical analysis of substrates and residues, Kolbe electrolysis, the design of a 100 lb/day facility, process description and economic analysis, continuous and fixed packed bed fermentation, and the mass, energy, and carbon balance for liquid hydrocarbon fuel production. A.R.H.

N81-14122# Department of Energy, Washington, D. C. Office of Technology Impacts.
SYNTHETIC FUELS AND THE ENVIRONMENT: AN ENVIRONMENTAL AND REGULATORY IMPACT ANALYSIS
Jun. 1980 652 p refs
(DOE/EV-0087) Avail: NTIS HC A99/MF A01

Deployment of synthetic fuels facilities to produce gaseous and liquid products from coals, shale, and biomass of approximately 1.5 million barrels per day by 1995 appears feasible in terms of successfully resolving critical environmental constraints. This success assumes that most effective environmental control technologies and practices are applied in these new facilities, and full utilization of operational monitoring information is made to identify and resolve unforeseen problem areas and uncertainties. The greatest areas of regulatory uncertainty are impacts of yet to be defined regulations. Such regulations include visibility, short term nitrogen regulations, hazardous waste standards, toxic product regulations, and occupational safety standards. Author

N81-14123# Bechtel National, Inc., San Francisco, Calif.
ETHANOL PRODUCTION FOR AUTOMOTIVE FUEL USAGE Final Technical Report, Jul. 1979 - Aug. 1980
R. A. Stenzel, J. Yu, T. E. Lindemuth, R. Soo-Hoo, S. C. May, Y. J. Yim, and E. H. Houle Aug. 1980 152 p refs
(Contract DE-AC07-79ID-12050)
(DOE/ID-12050/3) Avail: NTIS HC A08/MF A01

Production of ethanol from potatoes, sugar beets, and wheat using geothermal resources in the Raft River area of Idaho is evaluated. A 20 million gallon per year ethanol facility was selected as the largest scale plant that can be supported with the current agricultural resources. The conceptual plant is designed to operate on each of these three feedstocks for a portion of the year, but could operate year round on any of them. The processing facility uses conventional alcohol technology and uses geothermal energy for all process heating. There are three feedstock preparation sections, although the liquefaction and saccharification steps for potatoes and wheat involve common equipment. The fermentation, distillation, and by-product handling sections are common to all three feedstocks. The results of the evaluation suggest that a commercial scale geothermal alcohol facility in the Raft River is technically feasible and could be economically attractive, given the state and federal gasohol tax incentives. M.G.

N81-14124# Massachusetts Inst. of Tech., Cambridge. Dept. of Chemical Engineering.
CROSSED REACTION NETWORKS IN THE CATALYTIC HYDRODENITROGENATION OF SYNTHETIC LIQUID FUELS Quarterly Report, 1 Feb. - 30 Apr. 1980
Charles N. Satterfield and Shan Hsi 1980 11 p refs
(Contract DE-AC22-80PC-30094)
(DOE/PC-30094/1) Avail: NTIS HC A02/MF A01

The design of a hydrodenitrogenation reactor is discussed. The hydrodenitrogenation reactions are carried out in a laboratory scale trickle bed reactor, where the gas phase and liquid phase flow concurrently downward through a fixed bed of catalyst particles while the reaction takes place. The overall process flow sheet is given. The system is divided into the following sections: gas feed control system; liquid feed system; trickle bed reactor; gas liquid separation and sampling; sample analysis; automatic safety design; and clean up system. Each is described in some detail. M.G.

N81-14125# Argonne National Lab., Ill.
ALCOHOL PRODUCTION FROM AGRICULTURAL AND FORESTRY RESIDUES
L. Dale, R. Opilla, and T. Surles Sep. 1980 56 p refs Sponsored by DOE
(DOE/EV-0108) Avail: NTIS HC A04/MF A01

The production of ethanol from whole corn is discussed, with emphasis placed on the environmental aspects of the process, including land utilization and possible air and water pollutants. Ethanol is derived from renewable cellulosic substances by either enzymatic or acid hydrolysis of cellulose to sugar, followed by conventional fermentation and distillation. The use of two agricultural residues is reviewed: corn stover (field stalks remaining after harvest) and straw from wheat crops as a cellulosic feedstock. Two processes were evaluated with regard to environmental impact: a two stage acid process and an enzymatic process. The environmental residuals expected from the manufacture of methyl and ethyl alcohols from woody biomass are examined. The methanol is produced in a gasification process, whereas ethanol is produced by hydroloysis and fermentation processes similar to those used to derive ethanol from cellulosic materials. S.F.

N81-14126# Department of Energy, Washington, D. C. Coal Conversion Div.
COAL GASIFICATION QUARTERLY REPORT, APRIL - JUNE 1979
Apr. 1980 69 p refs
(DOE/FE-0002-79/2) Avail: NTIS HC A04/MF A01

DOE's program for the conversion of coal to gaseous fuels is discussed. Both high and low Btu gasification processes are being developed. High-Btu gas can be distributed economically to consumers in the same pipeline systems now used to carry natural gas. Low Btu gas, the cheapest of the gaseous fuels produced from coal, can be used economically only on site, either for electric power generation or by industrial and petrochemical plants. Author

N81-14127# Department of Energy, Morgantown, W. Va.
METHANE RECOVERY FROM COALBEDS. PROJECT PLAN DOCUMENT, FY 1981 Executive Summary Report
Sep. 1980 41 p refs
(DOE/TIC-11269) Avail: NTIS HC A03/MF A01

The Methane Recovery from Coalbeds Project for the utilization of the resource as an alternate fuel source is discussed. The project has clearly identified technology needs, potential uses, and some of the environmental, legislative, and social barriers. Some of the major milestones are as follows: (1) over 30 wells were drilled, cored, logged, and tested and well test reports prepared; (2) six reports were issued defining the characteristics of coal basins, including updated estimates of the coalbed methane resources; (3) research performed on fracture mechanics, stimulation, directional drilling, and horizontal drilling; (4) environmental, economic, and legal aspects of the technology were described; (5) ten production technology development projects are either in progress, or completed. L.F.M.

N81-14128# Missouri Univ. -Rolla.
PROGRESS IN WOOD GASIFICATION AT THE UNIVERSITY OF MISSOURI-ROLLA
M. E. Findley, V. J. Flanigan, Y. Omurtag, and H. H. Sineath 1980 25 p Presented at the 11th Biomass Thermochemical Conversion Contractors Meeting, Richland, Wash., 23-24 Sep. 1980

(Contract DE-AC02-79ET-23029)
(CONF-800973-1) Avail: NTIS HC A02/MF A01

The system provides recycle gas to fluidize the 40 inch reactor and permits the use of catalyst. The design allows the recycle gas to be scrubbed for CO2 removal if desired. Data from the preliminary testing of the facility is included. Some of the data was taken from a 6 inch reactor duplicating the larger system. The smaller reactor is also described. Gas Btu measurements were made with levels of 376 Btu using oxygen in the bed and 369 Btu in recycle alone. Principal factors affecting product gas quality and quantity are the material balance factors and the quantity of char and tar produced. The char and tar production is related primarily to reactor bed temperature, and can be used with feed rate and air rate to calculate the ratio of total carbon in all gas components to nitrogen. The carbon to nitrogen ratio allows estimation of heating value and total carbon and hydrogen concentrations in the dry gas from correlations. DOE

N81-14129# Brookhaven National Lab., Upton, N. Y.
PHOTOPRODUCTION OF HYDROGEN BY MEMBRANES OF GREEN PHOTOSYNTHETIC BACTERIA
J. D. Berstein and J. M. Olson 1980 6 p refs Presented at the 5th Intern. Photosynthesis Congr., Kassandra-Halkidiki, Greece, 7 Sep. 1980
(Contract DE-AC02-76CH-00016)
(BNL-28334; CONF-800963) Avail: NTIS HC A02/MF 01

Photoproduction of H2 from ascorbate by unit membrane vesicles from Chlorobium limicola f. thiosulfatophilum was achieved with a system containing gramicidin D, tetramethyl-p-phenylenediamine, methyl viologen, dithioerythritol, Clostridium hydrogenase, and an oxygen scavenging mixture of glucose, glucose oxidase, ethanol, and catalase. Maximum quantum yield was less than one percent. The reaction was inhibited completely by 0.3 percent sodium dodecylbenzene sulfonate, 1 percent Triton X-100, or preheating the vesicles at 100 C for 5 minutes. Low concentrations (0.01 and 0.05 percent) of Triton X-100 about doubled the reaction rate. DOE

N81-14130# Engineering Societies Commission on Energy, Inc., Washington, D. C.
ALTERNATE FUELS FOR INDUSTRIAL COMBUSTION ENGINES. REPORT ON TASK 018
R. L. Thomas Jun. 1980 92 p refs
(Contracts DE-AC01-77ET-10679; EF-77-C-01-2468)
(FE-2468-77) Avail: NTIS HC A05/MF A01

The various options for producing alternate fuels (synfuels) for large industrial combustion engine use are examined from the standpoint of current fuel usage and future engine development trends. This general class of engine in sizes above 1500 horsepower is widely utilized in the utility, transportation and industrial sectors to meet a variety of mechanical power needs. Consequently, industrial engine fuel demands are expected to be an important consideration as to which alternate fuels are developed as well as their commercial properties. The current emphasis on the development of various concepts for the processing of gaseous and distillate fuels from coal and shale will provide a reliable fossil fuel source for industrial engine utilization well beyond the year 2000. DOE

N81-14131# Battelle Pacific Northwest Labs., Richland, Wash.
METHANE OR METHANOL VIA CATALYTIC GASIFICATION OF BIOMASS
D. H. Mitchell, L. K. Mudge, R. J. Robertus, S. L. Weber, and L. J. Sealock, Jr. Mar. 1980 17 p refs Presented at Conversion of Biomass to Energy and Value Products Session, Am. Inst. Chem. Engr. 89th Ann. Meeting, Portland, Oreg., 17-20 Aug. 1980
(Contract DE-AC06-76RL-01830)
(PNL-SA-8049; CONF-800802-17) Avail: NTIS HC A02/MF A01

A 5 cm diameter reactor was used to determine the desired catalysts and operating temperature. A process development unit (PDU) demonstrated steam gasification of biomass with catalysts at rates up to 35 kg per hour. Methane yields of 0.28 cu nm per kg of dry wood were produced in the small laboratory reactor. Further methanation of the product gas mixture can increase methane yields to 0.33 cu nm/kg. The catalyst system was nickel and silica alumina. The preferred reactor operating temperature was 500 to 550 C. Tests were at atmospheric pressure. The PDU performance confirmed results obtained in the laboratory. Results show that methanol synthesis gas can be produced in a single stage reactor at 750 to 850 C by steam gasification wood with silica alumina and nickel catalysts present. From this gas, up to 0.6 kg of methanol can be produced per kg of wood. DOE

N81-14132# California Univ., Livermore. Lawrence Livermore Lab.
ANALYSIS OF EXPLOSIVE COMPOSITE RX-14-AE (HMX/POLYTHYLENE/OLEIC ACID)
Walter Selig Aug. 1980 11 p refs
(Contract W-7405-eng-48)
(UCID-18785) Avail: NTIS HC A02/MF A01

To a sample of the explosive, water was added and the oleic acid converted to the sodium salt by adjusting the pH to 12.2 to 12.5. The sodium oleate was titrated potentiometrically with standard cetylpyridinium chloride. Another sample was dissolved in dimethylsulfoxide and the HMX was titrated vs standard tetrabutylammonium hydroxide. Polyethylene was calculated by difference. DOE

N81-14133# National Bureau of Standards, Washington, D.C. Office of Recycled Materials.
RECYCLED PROGRAM: PHASE 1-TEST PROCEDURES FOR RECYCLED OIL USED AS BURNED FUEL Final Report
D. A. Becker and J. J. Comeford Aug. 1980 97 p refs Supersedes NBSIR78-1453
(PB80-215536; NBS-TN-1130; NBSIR-78-1453) Avail: NTIS HC A05/MF A01 CSCL 21D

The Energy Policy and Conservation Act requires the National Bureau of Standards (NBS) to develop test procedures which can be used to establish the substantial equivalence of recycled oils with new oils. The first phase of the NBS program is described. Test procedures are given which may be used for establishing the substantial equivalency of recycled petroleum oils (including blends of recycled oils with new oils) to new oils for use as a burner fuel. The test procedures were selected and evaluated for their ability to reliably measure the property under test. GRA

N81-14134# Science Applications, Inc., Canoga Park, Calif. Combustion Science and Advanced Technology Dept.
EFFICIENT UTILIZATION OF ALTERNATE FUELS: DEVELOPMENT OF MODELS FOR THE PREDICTION OF INTERCHANGEABILITY, DESIGN, AND PERFORMANCE OF GAS BURNER/COMBUSTOR SYSTEMS Final Report
P. T. Harsha, R. B. Edelman, and D. H. France 15 Apr. 1980 139 p refs Prepared for Gas Research Inst., Chicago, Ill.
(PB80-218282; SAI-80-018-CP; GRI-79/0034) Avail: NTIS HC A07/MF A01 CSCL 21D

A thorough survey and review of the state of the art of burner design techniques and gas interchangeability problems and prediction techniques was carried out. For burner design, a major problem area was shown to be the potential for conflicting requirements of increased efficiency and reduced emissions. The interchangeability assessment indicates that current methods are limited to the empirical data bases used for their development. In both areas a need exists for the establishment of more direct relationships between flame performance parameters and controllable design and operating parameters. An improved methodology for addressing this need with respect to residential, commercial, and industrial systems was defined. GRA

N81-14135# Dynatech Corp., Cambridge, Mass.
BIOCONVERSION OF BIOMASS GASIFIER PRODUCT GASES TO ORGANIC CHEMICALS Final Report, 1 Nov. 1978 - 13 Apr. 1980
P. F. Levy, G. W. Barnard, S. P. Evangelos, A. M. Boyer, and C. A. Tracy Apr. 1980 105 p refs
(Grant NSF PER-78-16404)
(PB80-216641; DYNATECH-2021; NSF/RA-800187) Avail: NTIS HC A06/MF A01 CSCL 21D

A simple and efficient high pressure culturing technique was developed as a means of selecting bacterial populations that could use gaseous substrates. A number of bacterial cultures

were selected on the basis of their ability to use either carbon monoxide/hydrogen (CO/H2) or carbon dioxide/hydrogen (CO2/H2). Cultures were successfully developed from mixed bacterial sources that utilize CO2/H2 or CO/H2. The primary liquid product is acetic acid which is formed from carbon contained in the feed gas. Other organic acids (propionic, butyric, valeric) were detected in the cultures, but the carbon source for these acids was not conclusively shown to be the feed gas. GRA

N81-14136# National Technical Information Service, Springfield, Va.
POLYCARBORANES. CITATIONS FROM THE NTIS DATA BASE Progress Report, 1964 - Jul. 1980
Diane M. Cavagnaro Sep. 1980 147 p Supersedes NTIS/PS-79/0913; NTIS/PS-78/0865
(PB80-814163; NTIS/PS-79/0913; NTIS/PS-78/0865) Avail: NTIS HC $30.00/MF $30.00 CSCL 21D

This bibliography covers the synthesis, polymerization, and the physical and molecular properties of carborane polymers and copolymers. Dexsil polymers and heat resistant properties are also covered. This updated bibliography contains 140 citations, 2 of which are new entries to the previous edition. GRA

31 ENGINEERING (GENERAL)

Includes vacuum technology; control engineering; display engineering; and cryogenics.

N81-14137* National Aeronautics and Space Administration. John F. Kennedy Space Center, Cocoa Beach, Fla.
FIRE EXTINGUISHING APPARATUS HAVING A SLIDABLE MASS FOR A PENETRATOR NOZZLE Patent
Norris C. Gray, Robert M. Senseny (Boeing Aerospace Co., Seattle, Wash.), and Philip N. Bolton (Boeing Aerospace Co., Seattle, Wash.) Issued 26 Aug. 1980 4 p Filed 19 Apr. 1978 Supersedes N78-22328 (16-13, p 1698)
(NASA-Case-KSC-11064-1; US-Patent-4,219,084; US-Patent-Appl-SN-897840; US-Patent-Class-169-70; US-Patent-Class-169-62) Avail: US Patent and Trademark Office CSCL 13L

A fire extinguishing apparatus for delivering an extinguishing agent through a tarrier surrounding a structure into its interior includes an elongated tubular nozzle body which has a pointed penetrating head carried on one end of the tubular body. A source of extinguishing agent coupled to the opposite end of the tubular body is fed through and passes through passages adjacent the head for delivering the extinguishing agent to the interior of the structure. A slidable mass is carried on the tubular body on a remote end of the tubular body from the penetrating head. By manipulating the slidable mass and bringing such in contact with an abutment the force imparted to the tubular body causes the head to penetrate the structure.
Official Gazette of the U.S. Patent and Trademark Office

N81-14138*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
THE 11TH SPACE SIMULATION CONFERENCE
Aleck C. Bond, ed. 1980 435 p refs Conf. held at Houston, Tex., 23-25 Sep. 1980
(NASA-CP-2150; S-508) Avail: NTIS HC A19/MF A01 CSCL 22A

Subect areas range from specialized issues dealing with the space and entry environments to the environmental testing of systems and complete spacecraft of present-day vintage. Various papers consider: the test and development of several key systems of the orbiter vehicle; integrated tests of complete satellites; new and unique test facilities developed to meet the demanding requirements of high fidelity simulation of test environments; and contamination species, including the instrumentation for detection and measurement of such. Special topics include improved thermal protection methodologies and approaches, sophisticated sensor developments, and other related testing and development areas. For individual titles, see N81-14139 through N81-14169.

N81-14139*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
COMPREHENSIVE TESTING OF A DEFENSE SYSTEMS COMMUNICATIONS SATELLITE c15
Neil K. Shirk and Stafford J. Keer *In its* The 11th Space Simulation Conf. 1980 p 1-12 (For primary document see N81-14138 05-31)
Avail: NTIS HC A19/MF A01 CSCL 22B

The system level testing of the defense satellite communications system (DSCS) 3 program is reviewed. Concentration is on the results of the systems tests of the DSCS 3 development test model (DTM). The DSCS 3DTM consisted of engineering components interconnected in an open bench layout. The DTM tests were performed to demonstrate satellite electrical performance characteristics and to uncover design deficiencies and interface problems. The availability of the DTM test results prior to the fabrication of the flight model hardware permited the incorporation of necessary design changes with a minimum impact on program costs and schedules. E.D.K.

N81-14140*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
EFFECTIVENESS OF SPACECRAFT TESTING PROGRAMS c18
A. Krausz *In its* The 11th Space Simulation Conf. 1980 p 13-23 ref (For primary document see N81-14138 05-31)
Avail: NTIS HC A19/MF A01 CSCL 22B

The need for testing under simulated mission operational conditions is discussed and the results of such tests are reviewed from the point of view of the user. A brief overview of the usal test sequences for high reliability long life spacecraft is presented and the effectiveness of the testing program is analyzed in terms of the defects which are discovered by such tests. The need for automation, innovative mechanical test procedures, and design for testability is discussed. E.D.K.

N81-14141*# General Electric Co., Philadelphia, Pa.
R. F. TESTING OF THE THIRD GENERATION DEFENSE COMMUNICATION SATELLITE c15
John Sargent and Michael Massaro *In* NASA. Johnson Space Center The 11th Space Simulation Conf. 1980 p 24-32 (For primary document see N81-14138 05-31)
Avail: NTIS HC A19/MF A01 CSCL 22B

The approach taken to test a completed DSCS communications satellite on a system level is described. Areas to be described are measuring RF isolation of separate communications subsystems and a test method which insures that one RF subsystem does not interfere with another. In addition, the method of complying with MIL-STD-1541 in the area of demonstrating safety of electroexplosive devices in an RF field is discussed. E.D.K.

N81-14142*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
PYROTECHNIC SHOCK AT THE ORBITER/EXTERNAL TANK FORWARD ATTACHMENT c16
William F. Rogers, David S. Grissom, and Larry R. Rhodes *In its* The 11th Space Simulation Conf. 1980 p 33-42 (For primary document see N81-14138 05-31)
Avail: NTIS HC A19/MF A01 CSCL 22B

During the initial certification test of the forward structural attachment of the space shuttle orbiter to the external tank, pyrotechnic shock from actuation of the separation device resulted in structural failure of the thermal protection tiles surrounding the attachment. Because of the high shock associated with the separation bolt, the development of alternative low shock separation designs was initiated. Two concepts that incorporate a 5.08 centimeter frangible nut as the release device were developed and tested. E.D.K.

N81-14143*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
THERMODYNAMIC PERFORMANCE TESTING OF THE ORBITER FLASH EVAPORATOR SYSTEM c16
James R. Jaax, Michael A. Melgares (United Technologies Corp., Houston, Tex.), and James P. Frahm (Rockwell International, Houston, Tex.) *In its* The 11th Space Simulation Conf. 1980 p 43-54 refs (For primary document see N81-14138 05-31)
Avail: NTIS HC A19/MF A01 CSCL 22B

System level testing of the space shuttle orbiter's development flash evaporator system (FES) was performed in a thermal vacuum chamber capable of simulating ambient ascent, orbital, and entry temperature and pressure profiles. The test article included the evaporator assembly, high load and topping exhaust duct and nozzle assemblies, and feedwater supply assembly. Steady state and transient heat load, water pressure/temperature and ambient pressure/temperature profiles were imposed by especially designed supporting test hardware. Testing in 1978 verified evaporator and duct heater thermal design, determined FES performance boundaries, and assessed topping evaporator plume characteristics. Testing in 1979 combined the FES with the other systems in the orbiter active thermal control subsystem (ATCS). The FES met or exceeded all nominal and contingency performance requirements during operation with the integrated ATCS. During both tests stability problems were encountered during steady state operations which resulted in subsequent design changes to the water spray nozzle and valve plate assemblies. E.D.K.

N81-14144*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
ORBITER INTEGRATED ACTIVE THERMAL CONTROL SUBSYSTEM TEST **c16**
James R. Jaax *In its* The 11th Space Simulation Conf. 1980 p 55-70 refs (For primary document see N81-14138 05-31)
Avail: NTIS HC A19/MF A01 CSCL 22B

Integrated subsystem level testing of the systems within the orbiter active thermal chamber capable of simulating ground, orbital, and entry temperature and pressure profiles. The test article was in a closed loop configuration that included flight type and functionally simulated protions of all ATCS components for collecting, transporting, and rejecting orbiter waste heat. Specially designed independently operating equipment simulated the transient thermal input from the cabin, payload, fuel cells, freon cold plates, hydraulic system, and space environment. Test team members using data, controls, and procedures available to a flight crew controlled the operation of the ATCS. The ATCS performance met or exceeded all thermal and operational requirements for planned and contingency mission support. E.D.K.

N81-14145*# High Vacuum Equipment Corp., Hingham, Mass.
USE OF CRYOPUMPS ON LARGE SPACE SIMULATION SYSTEMS **c37**
L. E. McCrary *In* NASA. Johnson Space Center The 11th Space Simulation Conf. 1980 p 71-78 refs (For primary document see N81-14138 05-31)
Avail: NTIS HC A19/MF A01 CSCL 13I

The need for clean, oil free space simulation systems has demanded the development of large, clean pumping systems. The assurance of optically dense liquid nitrogen baffles over diffusion pumps prevents backstreaming to a large extent, but does not preclude contamination from accidents or a control failure. Turbomolecular pumps or ion pumps achieve oil free systems but are only practical for relatively small chambers. Large cryopumps were developed and checked out which do achieve clean pumping of very large chambers. These pumps can be used as the original pumping system or can be retrofitted as a replacement for existing diffusion pumps. E.D.K.

N81-14146*# Spar Aerospace Products Ltd., Toronto (Ontario). RMS Div.
SHUTTLE REMOTE MANIPULATOR SYSTEM HARDWARE TEST FACILITY **c54**
C. G. Wagner-Bartak, J. A. Middleton, and J. A. Hunter (National Research Council of Canada, Ottawa) *In* NASA. Johnson Space Center The 11th Space Simulation Conf. 1980 p 79-94 refs (For primary document see N81-14138 05-31)
Avail: NTIS HC A19/MF A01 CSCL 05H

The shuttle remote manipulator (RMS) is designed and built for operations in a zero gravity environment. As such, the ground test facility for the integrated RMS must simulate conditions which support verification of the overall system performance. In order to allow ground test operations, a test facility was constructed with an area of 60 ft. x 120 ft. and extremely tight tolerances on floor flatness and slope. An air bearing support structure was designed for the RMS to operate with 4 degrees of freedom. The RMS system test facility and systems tests conducted to date are described. E.D.K.

N81-14147*# Spar Aerospace Products Ltd., Toronto (Ontario).
THE ROLE OF THE REAL-TIME SIMULATION FACILITY, SIMFAC, IN THE DESIGN, DEVELOPMENT AND PERFORMANCE VERIFICATION OF THE SHUTTLE REMOTE MANIPULATOR SYSTEM (SRMS) WITH MAN-IN-THE-LOOP **c54**
J. R. McCllough, A. Sharpe, and K. H. Doetsch (National Research Council of Canada, Ottawa) *In* NASA. Johnson Space Center The 11th Space Simulation Conf. 1980 p 94-112 refs (For primary document see N81-14138 05-31)
Avail: NTIS HC A19/MF A01 CSCL 05H

The SIMFAC has played a vital role in the design, development, and performance verification of the shuttle remote manipulator system (SRMS) to be installed in the space shuttle orbiter. The facility provides for realistic man-in-the-loop operation of the SRMS by an operator in the operator complex, a flightlike crew station patterned after the orbiter aft flight deck with all necessary man machine interface elements, including SRMS displays and controls and simulated out-of-the-window and CCTV scenes. The characteristics of the manipulator system, including arm and joint servo dynamics and control algorithms, are simulated by a comprehensive mathematical model within the simulation subsystem of the facility. Major studies carried out using SIMFAC include: SRMS parameter sensitivity evaluations; the development, evaluation, and verification of operating procedures; and malfunction simulation and analysis of malfunction performance. Among the most important and comprehensive man-in-the-loop simulations carried out to date on SIMFAC are those which support SRMS performance verification and certification when the SRMS is part of the integrated orbiter-manipulator system. E.D.K.

N81-14148*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
SHUTTLE MISSION SIMULATOR **c14**
Charles Olasky *In its* The 11th Space Simulation Conf. 1980 p 113-126 refs (For primary document see N81-14138 05-31)
Avail: NTIS HC A19/MF A01 CSCL 14B

The simulator was designed to provide real time simulation capability for all phases of the Shuttle Transportation System orbital missions including prelaunch, ascent, onorbit operations, deorbit, entry, approach/landing, and rollout. Full mission continuity is provided in transition between these mission phases. Dual fixed and motion base crew stations, instructor/operator stations, and computer systems allow parallel, simultaneous crew training with either complex capable of being individually integrated with the mission control center. This integrated training capability allows flight control personnel training in the air/ground interface areas of tracking, telemetry (vehicle systems monitoring), uplink command control, and communications. With the exception of the simulated Data Processing System, which utilizes actual flight computers and associated flight software, all orbiter onboard systems are functionally simulated with extensive simulated malfunction capabilities. Additionally, crew out-the-window visual scenes, and aural cues are rigorously simulated. E.D.K.

N81-14149*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
A RADIANT HEATING TEST FACILITY FOR SPACE SHUTTLE ORBITER THERMAL PROTECTION SYSTEM CERTIFICATION **c14**
William D. Sherborne and James D. Milhoan *In its* The 11th Space Simulation Conf. 1980 p 126-142 refs (For primary document see N81-14138 05-31)
Avail: NTIS HC A19/MF A01 CSCL 14B

A large scale radiant heating test facility was constructed so that thermal certification tests can be performed on the new generation of thermal protection systems developed for the space shuttle orbiter. This facility simulates surface thermal gradients, onorbit cold-soak temperatures down to 200 K, entry heating temperatures to 1710 K in an oxidizing environment, and the dynamic entry pressure environment. The capabilities of the facility and the development of new test equipment are presented. R.C.T.

N81-14150*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.

AN EFFECTIVE COMBINED ENVIRONMENT TEST FACILITY **c14**

Allen Deitch *In its* The 11th Space Simulation Conf. 1980 p 143-148 (For primary document see N81-14138 05-31)

Avail: NTIS HC A19/MF A01 CSCL 14B

A critical missile component required operational verification while subjected to combined environments within and beyond flight parameters. The testing schedule necessitated the design and fabrication of a test facility in order to provide the specified temperatures combined with humidity, altitude and vibration. R.C.T.

N81-14151*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.

AN INTEGRATIVE APPROACH TO SPACE-FLIGHT PHYSIOLOGY USING SYSTEMS ANALYSIS AND MATHEMATICAL SIMULATION **c52**

Joel I. Leonard (Management and Technical Services, Houston, Tex.), Ronald J. White (Management and Technical Services, Houston, Tex.), and John A. Rummel *In its* The 11th Space Simulation Conf. 1980 p 149-162 refs (For primary document see N81-14138 05-31)

(Contracts NAS9-11657; NAS9-12932; NAS9-14192; NAS9-14523; NAS9-15487)

Avail: NTIS HC A19/MF A01 CSCL 06P

An approach was developed to aid in the integration of many of the biomedical findings of space flight, using systems analysis. The mathematical tools used in accomplishing this task include an automated data base, a biostatistical and data analysis system, and a wide variety of mathematical simulation models of physiological systems. A keystone of this effort was the evaluation of physiological hypotheses using the simulation models and the prediction of the consequences of these hypotheses on many physiological quantities, some of which were not amenable to direct measurement. This approach led to improvements in the model, refinements of the hypotheses, a tentative integrated hypothesis for adaptation to weightlessness, and specific recommendations for new flight experiments. Author

N81-14152*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.

A MULTIFREQUENCY EVALUATION OF ACTIVE AND PASSIVE MICROWAVE SENSORS FOR OIL SPILL DETECTION AND ASSESSMENT **c43**

Richard G. Fenner, Stephen C. Reid, and Charles H. Solie *In its* The 11th Space Simulation Conf. 1980 p 163-187 refs Prepared in cooperation with Lockheed Engineering and Management Services Co., Inc., Houston, Tex. (For primary document see N81-14138 05-31)

Avail: NTIS HC A19/MF A01 CSCL 14B

An evaluation is given of how active and passive microwave sensors can best be used in oil spill detection and assessment. Radar backscatter curves taken over oil spills are presented and their effect on synthetic aperture radar (SAR) imagery are discussed. Plots of microwave radiometric brightness variations over oil spills are presented and discussed. Recommendations as to how to select the best combination of frequency, viewing angle, and sensor type for evaluation of various aspects of oil spills are also discussed. R.C.T.

N81-14153*# Faraday Labs., Inc., La Jolla, Calif.

INTERACTIONS OF SURFACES WITH THE SOLAR PLASMA **c16**

D. McKeown and C. R. Claysmith *In* NASA. Johnson Space Center The 11th Space Simulation Conf. 1980 P 188 - 200 refs (For primary document see N81-14138 05-31)

(Contract N00014-78-C-0373)

Avail: NTIS HC A19/MF A01

The induced environment is the main source of contamination on a spacecraft. The contamination of surfaces by volatile condensable material (VCM) present on spacecraft is being studied by many investigators both in the laboratory and space. In addition to VCM, the space environment is also a contributing factor in the contamination of surfaces. The effects of the interaction of the solar plasma with surfaces is examined. Plasma particles impact at energies in the multi-kilovolt range and penetrate and become trapped in surfaces. Results show that protons can penetrate up to 600 monolayers into surfaces and reach saturation concentrations of 6%. R.C.T.

N81-14154*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.

STS-1 MISSION CONTAMINATION EVALUATION APPROACH **c16**

Stephen Jacobs, Horst Ehlers, and Edgar R. Miller (NASA, Marshall Space Flight Center, Hunstville, Ala.) *In its* The 11th Space Simulation Conf. 1980 p 201-215 refs (For primary document see N81-14138 05-31)

Avail: NTIS HC A19/MF A01 CSCL 22B

The space transportation system 1 mission will be the first opportunity to assess the induced environment of the orbiter payload bay region. Two tools were developed to aid in this assessment. The shuttle payload contamination evaluation computer program was developed to provide an analytical tool for prediction of the induced molecular contamination environment of the space shuttle orbiter during its onorbit operations. An induced environment contamination monitor was constructed and tested to measure the space shuttle orbiter contamination environment inside the payload bay during ascent and descent and inside and outside the payload bay during the onorbit phase. Measurements are to be performed during the four orbital flight test series. Measurements planned for the first flight are described and predicted environmental data are discussed. The results indicate that the expected data are within the measurement range of the induced environment contamination monitor instruments evaluated, and therefore it is expected that useful contamination environmental data will be available after the first flight. R.C.T.

N81-14155*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.

EFFECTS OF THE SHUTTLE ORBITER FUSELAGE AND ELEVON ON THE MOLECULAR DISTRIBUTION OF WATER VAPOR FROM THE FLASH EVAPORATOR SYSTEM **c16**

Robert G. Richmond and Robert M. Kelso *In its* The 11th Space Simulation Conf. 1980 p 216-226 refs (For primary document see N81-14138 05-31)

Avail: NTIS HC A19/MF A01 CSCL 22B

A concern has arisen regarding the emissive distribution of water molecules from the shuttle orbiter flash evaporator system (FES). The role of the orbiter fuselage and elevon in affecting molecular scattering distributions was nuclear. The effect of these components were evaluated. Molecular distributions of the water vapor effluents from the FE were measured. These data were compared with analytically predicted values and the resulting implications were calculated. R.C.T.

N81-14156*# European Space Research and Technology Center, Noordwijk (Netherlands).

OUTGASSING TESTS ON IRAS SOLAR PANEL SAMPLES **c44**

G. Premat, A. Zwaal, and N. H. Pennings (Fokker Space Div., Schiphol, Netherlands) *In* NASA. Johnson Space Center The 11th Space Simulation Conf. 1980 p 227-242 (For primary document see N81-14138 05-31)

Avail: NTIS HC A19/MF A01 CSCL 10A

Several outgassing tests were carried out on representative solar panel samples in order to determine the extent of contamination that could be expected from this source. The materials for the construction of the solar panels were selected as a result of contamination obtained in micro volatile condensable materials tests. R.C.T.

N81-14157*# Boeing Aerospace Co., Seattle, Wash.

IUS SOLID ROCKET MOTOR CONTAMINATION PREDICTION METHODS **c20**

C. R. Mullen and J. H. Kearnes *In* NASA. Johnson Space Center The 11th Space Simulation Conf. 1980 p 243-256 refs (For primary document see N81-14138 05-31)

Avail: NTIS HC A19/MF A01 CSCL 21H

A series of computer codes were developed to predict solid rocket motor produced contamination to spacecraft sensitive surfaces. Subscale and flight test data have confirmed some of the analytical results. Application of the analysis tools to a typical

spacecraft has provided early identification of potential spacecraft contamination problems and provided insight into their solution; e.g., flight plan modifications, plume or outgassing shields and/or contamination covers. R.C.T.

N81-14158*# Berkeley Industries, Laguna Beach, Calif.
PERFORMANCE OF A FLIGHT QUALIFIED, THERMOELECTRICALLY TEMPERATURE CONTROLLED QCM SENSOR WITH POWER SUPPLY, THERMAL CONTROLLER AND SIGNAL PROCESSOR c20
Donald A. Wallace *In* NASA. Johnson Space Center The 11th Space Simulation Conf. 1980 p 257-268 refs (For primary document see N81-14138 05-31)
Avail: NTIS HC A19/MF A01 CSCL 21C

A thermoelectrically temperature controlled quartz crystal microbalance (QCM) system was developed for the measurement of ion thrustor generated mercury contamination on spacecraft. Meaningful flux rate measurements dictated an accurately held sensing crystal temperature despite spacecraft surface temperature variations from -35 C to +60 C over the flight temperature range. An electronic control unit was developed with magentic amplifier transformer secondary power supply, thermal control electronics, crystal temperature analog conditioning and a multiplexed 16 bit frequency encoder. R.C.T.

N81-14159*# Aerospace Corp., El Segundo, Calif.
WATER-DEUTERIUM OXIDE EXCHANGE IN POLYMERS USED IN SPACECRAFT APPLICATIONS c27
D. J. Carre *In* NASA. Johnson Space Center The 11th Space Simulation Conf. 1980 p 269-279 refs (For primary document see N81-14138 05-31)
(Contract F04701-79-C-0080)
Avail: NTIS HC A19/MF A01 CSCL 07C

The replacement of water (H2O) by deuterium oxide (D2O) and the exchange between atmospheric water and adsorbed or absorbed D2O were investigated for the polymeric materials Kapton and Mylar using thermal gravimetric analysis and infrared spectroscopy. Replacement of H2O by D2O is easily accomplished. However, exposure of D2O samples to the ambient atmosphere or gases containing H2O results in rapid proton and deuteron exchange between H2O vapor and adsorbed D2O. Replacement of H2O by D2O would not be a practical solution to alleviate spectral interferences that would result from water outgassing in spacecraft orbital environments. Maintaining the materials of interest in a dehydrated state is a more reasonable approach. Author

N81-14160*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
THE IDENTIFICATION OF TRENDS IN OUTGASSING TECHNOLOGY c25
Joe A. Colony *In its* The 11th Space Simulation Conf. 1980 p 280-290 (For primary document see N81-14138 05-31)
Avail: NTIS HC A19/MF A01 CSCL 07D

A large amount of chemical analysis data involving identification of outgassing products from spacecraft, experiment modules, and support equipment accumulated at the Goddard Space Flight Center over the past ten years were reduced to a computer compatible format and subjected to a variety of relevant program operations. From these data a list of the most troublesome outgassing species were compiled and several useful and interesting materials' correlations were developed. The frequency of occurrence totals show that in aerospace program, di(2-ethyl hexyl) phthalate (DEHP) is the most often found individual species in outgassing samples and that esters are the leading generic class of compounds. The effectiveness of this data bank was demonstrated by the good correlations between materials and their outgassing products for solar panel bakeouts and cable bakeouts. However, trends in frequency of occurrence of many compounds were demonstrated where no correlation could be established. In the case of the class of compounds called aliphatic hydrocarbons, it is shown that the number of instances of significant outgassing due to these materials is increasing. A.R.H.

N81-14161*# General Electric Co., Utica, N. Y. Aircraft Equipment Div.
THE USE OF THE PRINCIPLE OF SUPERPOSITION IN MEASURING AND PREDICTING THE THERMAL CHARACTERISTICS OF AN ELECTRONIC EQUIPMENT OPERATED IN A SPACE ENVIRONMENT c33
Earl H. Gale *In* NASA. Johnson Space Center The 11th Space Simulation Conf. 1980 p 291-297 refs (For primary document see N81-14138 05-31)
Avail: NTIS HC A19/MF A01 CSCL 09C

The advantages and possible pitfalls of using a generalized method of measuring and, based on these measurements, predicting the transient or steady-state thermal response characteristics of an electronic equipment designed to operate in a space environment are reviewed. The method requires generation of a set of thermal influence coefficients by test measurement in vacuo. A implified thermal mockup isused in this test. Once this data set is measured, temperatures resulting from arbitrary steady-state or time varying power profiles can be economically calculated with the aid of a digital computer. A.R.H.

N81-14162*# Martin Marietta Corp., Denver, Colo. Space Simulation Lab.
P78-2 (SCATHA) SATELLITE THERMAL BALANCE TEST, A LABORATORY TEST c35
Robert P. Parrish, Jr. *In* NASA. Johnson Space Center The 11th Space Simulation Conf. 1980 P 298-304 (For primary document see N81-14138 05-31)
Avail: NTIS HC A19/MF A01 CSCL 14B

Space simulation test programs can be carried out with a high probability of being troublefree with a competent staff, a well-maintained test facility and attention to interfaces; however, full-up thermal balance tests using the solar simulator, temperature control of infrared sources, the gimbal, a large number of thermocouples, and other requirements for a high fidelity thermal balance are still a challenge. The P78-2 (Scatha) satellite was successfully tested with one interruption and a four-day abbreviated retest to verify a modification. This was accomplished in spite of the new test crew, a facility beset with several operational problems, and marginal interface control. These problems were addressed with very good results. Subsequent tests have been highly successful. A.R.H.

N81-14163*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex. Space Simulation Lab.
THERMAL VACUUM PERFORMANCE TESTING OF THE SPACE SHUTTLE ORBITER RADIATOR SYSTEM c34
Albert F. Behrend, Jr., Gorden D. Chandler (Rockwell International Corp., Houston, Tex.), and Harold R. Howell (Vought Corp., Dallas) *In its* The 11th Space simulation Conf. 1980 p 305-317 refs (For primary document see N81-14138 05-31)
Avail: NTIS HC A19/MF A01 CSCL 20D

A space shuttle orbiter system thermal vacuum performance test was conducted at NASA-Johnson Space Center in Chamber A of the space envvironment simulation laboratory. The test of objective was to verify the radiator system heat rejection performance capability utilizing two development and two flight radiator panels comprising one of the two Orbiter Freon-21 coolant loops. Radiator performance over the range of expected flight conditions was as predicted, and there was no degradation of performance after extended vacuum exposure. Author

N81-14164*# Industrieanlagen-Betriebsgesellschaft m.b.H., Ottobrunn (West Germany). Space Div.
SOLAR PANEL THERMAL CYCLING TESTING BY SOLAR SIMULATION AND INFRARED RADIATION METHODS c44
Hubert E. Nuss *In* NASA. Johnson Space Center The 11th Space Simulation Conf. 1980 p 318-330 refs (For primary document see N81-14138 05-31)
Avail: NTIS HC A19/MF A01 CSCL 10A

For the solar panels of the European Space Agency (ESA) satellites OTS/MAROTS and ECS/MARECS the thermal cycling tests were performed by using solar simulation methods. The performance data of two different solar simulators used and the thermal test results are described. The solar simulation thermal cycling tests for the ECS/MARECS solar panels were carried out with the aid of a rotatable multipanel test rig by which simultaneous testing of three solar panels was possible. As an

alternative thermal test method, the capability of an infrared radiation method was studied and infrared simulation tests for the ultralight panel and the INTELSAT 5 solar panels were performed. The setup and the characteristics of the infrared radiation unit using a quartz lamp array of approx. 15 sq and LN2-cooled shutter and the thermal test results are presented. The irradiation uniformity, the solar panel temperature distribution, temperature changing rates for both test methods are compared. Results indicate the infrared simulation is an effective solar panel thermal testing method. Author

N81-14165*# Aerojet Liquid Rocket Co., Sacramento, Calif.
THERMAL PROTECTION OF REENTRY VEHICLES BY ACTIVELY COOLED NOSETIPS **c34**
R. E. Walker and J. W. Hidahl *In* NASA. Johnson Space Center The 11th Space Simulation Conf. 1980 p 331-346 refs Prepared in cooperation with Aerojet Services Co., Sacramento, Calif. (For primary document see N81-14138 05-31)
Avail: NTIS HC A19/MF A01 CSCL 20D

Analytical modeling efforts and clear-air ground test results of a transportation-cooled nosetips (TCNT) design are presented. The discrete water injection platelet TCNT described was conceived and created to achieve the performance requirements for severe reentry vehicle trajectories. Thermal performance computer modeling techniques, combing both local heat blockage and boundary layer recovery enthalpy reduction are outlined. A.R.H.

N81-14166*# ARO, Inc., Arnold Air Force Station, Tenn. AEDC Div.
NEW METHODS TO DETECT PARTICLE VELOCITY AND MASS FLUX IN ARC-HEATED ABLATION/EROSION FACILITIES **c09**
D. B. Brayton, B. W. Bomar, B. L. Seibel, and P. D. Elrod *In* NASA. Johnson Space Center The 11th Space Simulation Conf. 1980 p 347-377 refs (For primary document see N81-14138 05-31)
Avail: NTIS HC A19/MF A01 CSCL 14B

Arc-heated flow facilities with injected particles are used to simulate the erosive and ablative/erosive environments encountered by spacecraft re-entry through fog, clouds, thermo-nuclear explosions, etc. Two newly developed particle diagnostic techniques used to calibrate these facilities are discussed. One technique measures particle velocity and is based on the detection of thermal radiation and/or chemiluminescence from the hot seed particles in a model ablation/erosion facility. The second technique measures a local particle rate, which is proportional to local particle mass flux, in a dust erosion facility by photodetecting and counting the interruptions of a focused laser beam by individual particles. Author

N81-14167*# Battelle Columbus Labs., Ohio.
THERMAL STRESS RESPONSE OF GENERAL PURPOSE HEAT SOURCE (GPHS) AEROSHELL MATERIAL **c39**
I. M. Grinberg, L. E. Hulbert, and R. G. Luce *In* NASA. Johnson Space Center The 11th Space Simulation Conf. 1980 p 378-389 refs (For primary document see N81-14138 05-31)
Avail: NTIS HC A19/MF A01 CSCL 20K

A thermal stress test was conducted to determine the ability of the GPHS aeroshell 3 D FWPF material to maintain physical integrity when exposed to a severe heat flux such as would occur from prompt reentry of GPHS modules. The test was performed in the Giant Planetary Facility at NASA's Ames Research Center. Good agreement was obtained between the theoretical and experimental results for both temperature and strain time histories. No physical damage was observed in the test specimen. These results provide initial corroboration both of the analysis techniques and that the GPHS reentry member will survive the reentry thermal stress levels expected. Author

N81-14168*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
SPACE SHUTTLE ORBITER NOSE CAP AND WING LEADING EDGE CERTIFICATION TEST PROGRAM **c16**
Murray J. Suppanz (Rockwell International, Downey, Calif.) and John E. Grimaud *In its* The 11th Space Simulation Conf. 1980 p 390-409 (For primary document see N81-14138 05-31)
Avail: NTIS HC A19/MF A01 CSCL 22B

A reinforced carbon-carbon thermal protection system is used on the space shuttle orbiter vehicle's nose cap and wing leading edge regions where temperatures reach 1538 C (2800 F). To verify the analyses used to certify reinforced carbon-carbon for the first flight and operational missions, a multi-environment incremental test program was developed and implemented through the combined efforts of Rockwell International and the National Aeronautics and Space Administration. Three separate facilities at the Johnson Space Center were used to subject full-scale nose cap and wing leading edge test articles to simulated critical launch, on-orbit, and atmospheric entry environments. Author

N81-14169*# Aerospace Corp., El Segundo, Calif.
HEATSHIELD MATERIAL SELECTION FOR ADVANCED BALLISTIC REENTRY VEHICLES **c24**
P. J. Legendre, T. Holtz, and J. C. Sikra (Air Force Ballistic Missile Office, Norton AFB, Calif.) *In its* The 11th Space Simulation Conf. 1980 p 410-426 refs (For primary document see N81-14138 05-31)
Avail: NTIS HC A19/MF A01 CSCL 11D

The Performance of staple rayon fiber and AVTEX continuous rayon fiber was evaluated as precursor materials for heatshields. The materials studied were referenced to the IRC FM5055A heatshield materials flown during the past decade. Three different arc jet facilities were used to simulate portions of the reentry environment. The IRC FM5055A and the AVTEX FM5055G, both continuous rayon fiber woven materials having the phenolic impregnant filled with carbon particles were compared. The AVTEX continuous fiber, unfilled material FM5822A was also examined to a limited extent. Test results show that the AVTEX FM5055G material provided a close substitute for the IRC FM5055A material both in terms of thermal protection and roll torque performance. A.R.H.

N81-14170# National Physical Lab., Teddington (England). Div. of Quantum Metrology.
ERRORS ASSOCIATED WITH IMPERFECT SURFACES IN STANDARD HOT-PLATE THERMAL CONDUCTIVITY MEASUREMENTS
J. M. Corsan and I. Williams Feb. 1980 47 p refs (NPL-QU-57; ISSN-0309-3050) Avail: NTIS HC A03/MF A01

A simple, two dimensional thermal resistance model is used to derive the magnitude of temperature variations on the surfaces of specimens used in hot plate measurements, caused by extended shallow defects on the surfaces of the plates, thermal contact sheets or specimens. Under certain circumstances, depending on the thermal resistance of the defect relative to the other components, these variations can be quite large. This is particularly the case when the defect is essentially an air pocket of high thermal resistance caused by the use of an insufficiently compressible contact material. Results are discussed with reference to the accuracy of practical thermal conductivity measurements. The dimensional tolerances specified for plates and specimens should be strictly adhered to and some minor amendments to the standard are suggested, involving the introduction of closer tolerances on all surfaces including those of the thermal contact sheets, which should have adequate compressibility. Author

N81-14171# National Physical Lab., Teddington (England). Div. of Quantum Metrology.
THE USE OF MAGNESIUM FLUORIDE WINDOWS IN AN ARGON WALL-STABILIZED MINI-ARC
C. Brookes Apr. 1980 27 p refs (NPL-QU-58; ISSN-0309-3050) Avail: NTIS HC A03/MF A01

The effects of irradiation of magnesium fluoride windows when used in an argon miniarc was investigated. Efforts made to restore original transmission values after such use are described. The effect of color center formation in alkali halides as caused by ionizing radiation are reviewed. R.C.T.

N81-14172# Rolls-Royce Ltd., Derby (England).
HYDROFORMING PROCESS FOR PRESSINGS
R. Boucher 1980 13 p Transl. into ENGLISH from Mecanique, (France), v. 51, Dec. 1968, p 13-15 In ENGLISH and FRENCH Presented at GAMI, 10-11 Jan. 1968
(PNR-90026) Avail: NTIS HC A02/MF A01

A new method of producing pressings using special machines known as 'hydroforms' and the process known as 'hydroforming' are described. Author

N81-14173# Rolls-Royce Ltd., Derby (England).
ELECTRO-CHEMICAL POLISHING OF COBALT IN ETHYLENE GLYCOL AND DIMETHYL FORMAMIDE SOLUTIONS OF COBALT CHLORIDE
A. N. Turashev, T. G. Mukhemyetgaliev, and R. G. Rakhmatullina 1980 3 p refs Transl. into ENGLISH from Master. Nauch Konf. (Kazan, USSR), 1969 p 238-240
(PNR-90027) Avail: NTIS HC A02/MF A01

The electrochemical polishing of cobalt is carried out in solutions of acids. Known electrolytes possess two significant faults: aggressiveness of electrolytes; and breakdown of the balance of the composition of the electrolytes in process of operation. Two new electrolytes for electrochemical polishing of cobalt using organic solvents are described. With the objective of developing new electrolytes for electrochemical polishing of cobalt, two systems - ethylene glycol and dimethyl formamide solutions of cobalt chloride were examined. The choice of ethylene glycol and dimethyl formamide as solvents is based on their good capability of dissolving inorganic salts, including cobalt chloride. In the systems investigated, the electrochemical polishing of cobalt is possible within wide relationship limits of concentrations of cobalt chloride and an organic solution. S.F.

N81-14174# Rolls-Royce Ltd., Derby (England).
HOT FLOW TURNING T-A6V TITANIUM ALLOY
M. Brun and J. Duriau 1980 13 p Transl. into ENGLISH from Mecanique, (France), No. 298, Oct. 1974 p 19-23
(PUR-90028) Avail: NTIS HC A02/MF A01

Flow turning on T-A6V is examined under two different aspects: cylindrical flow turning of tubes financed by DRME and curvi-linear flow turning of casings for gas turbines financed by the STAe. The main purpose sought is to be able to use flow items with no further processing, which is possible due to the slight effect of heat treatment on the mathematical characteristics of this alloy. The major difficulty to be solved is fixing the temperature on which the dimensional accuracy, contamination, and surface finish of the components closely depend. L.F.M.

N81-14175# Construction Technology Labs., Skokie, Ill. Structural Analysis Section.
DESIGN CRITERIA FOR DEFLECTION CAPACITY OF CONVENTIONALLY REINFORCED CONCRETE SLABS. PHASE 1: STATE-OF-THE-ART REPORT Final Report, Jan. - Aug. 1979
Mohammad Iqbal and Arnaldo T. Derecho Port Hueneme, Calif. Naval Civil Engineering Lab. Oct. 1980 150 p refs
(Contract N68305-79-C-0009; YF60534091)
(AD-A091738; CEL-CR-80.026) Avail: NTIS HC A07/MF A01 CSCL 13/13

In this Phase 1 report, data obtained from a literature search of static and dynamic tests on uniformly loaded reinforced concrete one-way and two-way slabs are tabulated. Analytical methods for predicting incipient collapse deflection are summarized and compared to the test results. A method for predicting incipient collapse deflection, when tensile membrane resistance can be developed, is recommended for further study in Phase 2 of a three phase study. The recommended relationship gives incipient collapse deflection as a function of the short span of the slab and the rupture strain of the reinforcing steel. GRA

N81-14176# Construction Technology Labs., Skokie, Ill. Structural Analytical Section.
DESIGN CRITERIA FOR DEFLECTION CAPACITY OF CONVENTIONALL REINFORCED CONCRETE SLABS. PHASE 2: DESIGN AND CONSTRUCTION REQUIREMENTS Final Report, Aug. 1979 - Jan. 1980
Takehira Takayanagi, Arnaldo T. Derecho, and Mohammed Iqbal Port Hueneme, Calif. Naval Civil Engineering Lab. Oct. 1980 78 p refs
(Contract N68305-79-C-0009; YF60534091)
(AD-A091517; CEL-CR-80.027) Avail: NTIS HC A05/MF A01 CSCL 11/2

Incipient collapse deflection data and an analysis method, reported in Phase 1 of this study, were used to propose an incipient collapse deflection criteria for one-way and two-way slabs. A relationship for the incipient collapse deflection of slabs, when tensile membrane action can be developed, is given in terms of the short span and steel rupture strains. Structural design details, to insure that membrane action can be developed, are discussed and experimental verification tests are recommended. The Phase 3 report will recommend a design procedure for one-way and two-way slabs subjected to blast loads. GRA

N81-14177# Construction Technology Labs., Skokie, Ill. Structural Analysis Section.
DESIGN CRITERIA FOR DEFLECTION CAPACITY OF CONVENTIONALLY REINFORCED CONCRETE SLABS. PHASE 3: SUMMARY OF DESIGN CRITERIA AND DESIGN AND CONSTRUCTION DETAILS; DESIGN EXAMPLES Final Report, Jan. - May 1980
Takehira Takayanagi and Arnaldo T. Derecho Port Hueneme, Calif. Naval Civil Engineering Lab. Oct. 1980 101 p refs
(Contract N68305-79-C-0009; YF60534091)
(AD-A091616; CEL-CR-80.028) Avail: NTIS HC A06/MF A01 CSCL 13/13

A design procedure is given for one-way and two-way standard reinforced concrete slabs allowed to respond to incipient collapse under blast loads. When tensile membrane action can be developed, larger incipient collapse deflections can be used in design than are currently allowed in the design manual. Design and construction requirements are specified to insure adequate tensile membrane resistance. A supplement is proposed for consideration as a supplement to the design manual. GRA

N81-14178# King Research, Inc., Rockville, Md.
U.S. METRIC BOARD 1979 SURVEY OF SELECTED LARGE U.S. FIRMS AND INDUSTRIES Final Report, Dec. 1979 - Jun. 1980
Lisa L. King 19 May 1980 128 p refs
(Contract MB-79-581)
(AD-A091618) Avail: NTIS HC A07/MF A01 CSCL 14/2

A mail survey of randomly chosen 202 of the 1000 largest manufacturing and mining firms, as listed by Fortune magazine, was conducted in late 1979 and early 1980. About 64 percent (112 firms) responded with useful data. Among the findings are: about 63 percent of the largest firms produce at least one metric product; about 48 percent of exported sales are of metric products; about three quarters of the firms selling metric products sell products labelled in customary and metric units (soft conversion); about half the firms selling metric products sell hard converted products (products manufactured in metric units); little corporate coordination and planning seems to accompany conversion to the metric system; about one-third of the firms see laws and reputation impeding conversion; over 50 percent see lack of customer demand as inhibiting conversion; and the most realistic time period for conversion is 10 years, the minimum time for conversion (under pressure) is three years, and the perferred time (at the firm's own pace) is eight years. GRA

N81-14179# California Univ., Berkeley. Lawrence Berkeley Lab. Engineering and Technical Services Div.
TPC MAGNET CRYOGENIC SYSTEM
M. A. Green, W. A. Burns, J. D. Taylor, and H. W. VanSlyke Mar. 1980 118 p refs
(Contract W-7405-eng-48)
(LBL-10552) Avail: NTIS HC A06/MF A01

The cryogenic system developed for the time projections chamber TPC magnet is discussed. This system uses forced two-phase tubular cooling with the two cryogens in the system. The liquid helium and liquid nitrogen are delivered through the cooled load by forced tubular flow. The only reservoirs of liquid cryogen exist in the control dewar (for liquid helium) and the conditioner dewar (for liquid nitrogen). The operation of these systems during virtually all phases of system operation are described. Photographs and diagrams of various system components are shown, and cryogenic system data are presented. DOE

N81-14180# Oak Ridge Y-12 Plant, Tenn.
ELECTROCHEMICAL MACHINING IN-PROCESS DATA COLLECTION AND CONTROL
R. E. Neal Sep. 1980 27 p refs

(Contract W-7405-eng-26)
(Y-2209) Avail: NTIS HC A03/MF A01

A system was devised to use a computer for collecting data from the electrochemical machining (ECM) process and for monitoring and controlling ECM operations. It is believed that these data collections and analyses will lead to the formulation of algorithms to produce parts with better tolerances and will allow more efficient uses of the ECM machines. One algorithm was developed to allow the efficient ECM of large surface area parts. Such programs and equipment will enhance the competitive position of the ECM process in machining applications previously performed by more conventional methods while minimizing electrical power consumption. DOE

N81-14181# Sydney Univ. (Australia). Civil Engineering Labs.
DETERMINATION OF SOIL PROPERTIES FROM FIELD OBSERVATIONS OF SETTLEMENT
P. T. Brown and J. B. Burland Mar. 1980 32 p refs
(PB80-213226) Avail: NTIS HC A03/MF A01 CSCL 13B

Field observations of settlement beneath the ground surface, caused by a load such as a building, are proposed as a means of determination of moduli and coefficients of consolidation when the soil is sensitive to disturbance. Planning a test, instrumentation and analysis of measurements are discussed. GRA

N81-14182# Transportation Research Board, Washington, D.C.
SEALING JOINTS AND CRACKS, THIN RESURFACING, AND LOCATING VOIDS UNDER CONCRETE SLABS
Wouter Gulden, Gordon K. Ray, I. Minkarah, J. P. Cook, and J. B. Thornton 1980 38 p refs
(PB80-215635; TRB/TRR-752; ISBN-0-309-03062-5; LC-80-23303) Avail: NTIS HC A03/MF A01 CSCL 13B

The six papers in this report deal with the following areas: effect of defective joint seals on pavement performance; pavement design features and their effect on joint seal performance; pavement restoration measures to precede joint resealing; and conditions and operations for joint and crack resealing of airfield pavement. The use of a very thin overlay to reestablish the skid resistance of a concrete pavement and applicability of radar subsurface profiling in estimating sidewalk undermining are also discussed. GRA

N81-14183# Hawaii Univ., Honolulu. Dept. of Ocean Engineering.
DEVELOPMENT OF AN ASP (AIR STABILIZED PLATFORM)
L. H. Seidl Jul. 1980 159 p
(Contract DO-A01-78-00-3104)
(PB80-221997; MA-RD-940-80098) Avail: NTIS HC A08/MF A01 CSCL 13J

A type of platform termed Air Stabilized Platform or ASP for short, was developed. The effect of the compressibility of air was given in terms of an air pocket factor f sub air. Functional relationships for f sub air with respect to internal draft of the airpocket and its geometry are developed. Several generic platform designs based on the ASP concept were designed and model tested. The platforms were moored by spread mooring, tension leg mooring or were free floating. Realistic applications of the ASP as support platforms for floating industrial plants were considered. GRA

N81-14184# National Bureau of Standards, Washington, D.C.
SPECIFICATIONS, TOLERANCES, AND OTHER TECHNICAL REQUIREMENTS FOR WEIGHING AND MEASURING DEVICES. 1980 EDITION Annual Report
H. F. Wollin, ed. Sep. 1980 209 p *refs*
(PB80-213622; NBS-HB-44-1980; NBS-HB-44-1979; LC-14-10563) Avail: NTIS HC A10/MF A01 CSCL 14B

Amendments adopted by the 65th National Conference on Weights and Measures during its annual meeting in 1980 are included in this edition of Handbook 44 which is published in its entirety each year. GRA

32 COMMUNICATIONS

Includes land and global communications; communications theory; and optical communications.

For related information see also *04 Aircraft Communications and Navigation* and *17 Spacecraft Communications, Command and Tracking.*

N81-14185* National Aeronautics and Space Administration. Pasadena Office, Calif.
FREQUENCY TRANSLATING PHASE CONJUGATION CIRCUIT FOR ACTIVE RETRODIRECTIVE ANTENNA ARRAY Patent
Ralph C. Chernoff, inventor (to NASA) (JPL, California Inst. of Tech., Pasadena) Issued 11 Nov. 1980 10 p Filed 29 Dec. 1978 Supersedes N79-14277 (17-05, p 0585) Sponsored by NASA
(NASA-Case-NPO-14536-1; US-Patent-4,233,606; US-Patent-Appl-SN-974471; US-Patent-Class-343-100TD) Avail: US Patent and Trademark Office CSCL 09C

An active retrodirective antenna array which has central phasing from a reference antenna element through a 'tree' structured network of transmission lines utilizes a number of phase conjugate circuits (PCCs) at each node and a phase reference regeneration circuit (PRR) at each node except the initial node. Each node virtually coincides with an element of the array. A PCC generates the exact conjugate phase of an incident signal using a phase locked loop which combines the phases in an up converter, divides the sum by 2 and mixes the result with the phase in a down converter for phase detection. The PRR extracts the phase from the conjugate phase. Both the PCC and the PRR are not only exact but also free from mixer degeneracy.
Official Gazette of the U.S. Patent and Trademark Office

N81-14186* National Aeronautics and Space Administration. Pasadena Office, Calif.
PRECISE RF TIMING SIGNAL DISTRIBUTION TO REMOTE STATIONS Patent
Georg F. Lutes, Jr., inventor (to NASA) (JPL, California Inst. of Tech., Pasadena) Issued 18 Nov. 1980 4 p Filed 24 Sep. 1979 Supersedes N79-34013 (17-24, p 3284) Sponsored by NASA
(NASA-Case-NPO-14749-1; US-Patent-4,234,971; US-Patent-Appl-SN-078521; US-Patent-Class-455-619; US-Patent-Class-375-107; US-Patent-Class-455-51; US-Patent-Class-455-71) Avail: US Patent and Trademark Office CSCL 20N

A method and apparatus are disclosed for distributing a stable reference frequency from a hydrogen maser frequency standard, or similar RF source, to remote stations over great distances with very good phase stability, and with constant amplitude, at each distribution point using a light beam carrier. A technique for providing automatic gain control at an optical receiver with phase stability in the RF reference is provided.
Official Gazette of the U.S. Patent and Trademark Office

N81-14187* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
COAXIAL PHASED ARRAY ANTENNA Patent
Haynes Ellis, Jr., inventor (to NASA) (Rockwell International Corp., Downey, Calif.) Issued 19 Aug. 1980 12 p Filed 17 Oct. 1978 Supersedes N79-19194 (17 - 10, p 1262) Sponsored by NASA
(NASA-Case-MSC-16800-1; US-Patent-4,218,685; US-Patent-Appl-SN-953313; US-Patent-Class-343-727; US-Patent-Class-343-797; US-Patent-Class-343-789) Avail: US Patent and Trademark Office CSCL 09C

A coaxial antenna array for communicating circularly polarized electromagnetic radiation is disclosed. A pair of open ended antenna cavities is coaxially constructed and operates by excitation of linear radiation elements arranged within each of the cavities. A pair of crossed dipole radiation devices is centered within the inner cavity and operated by means of a phase shifting network circuit to transmit as well as receive circularly polarized radiation. Four monopole radiation devices are symmetrically arranged to operate in the outer cavity in phase quadrature by means of the phase shifting network circuit to both transmit and receive

circularly polarized electromagnetic radiation. Combined operation of the two antenna cavities with a 180 deg phase differential between the fields related to the two antenna cavities provides a broad beam, relatively wide frequency bandwidth communication capability. Particular embodiments disclosed feature a generally square cavity array as well as a circular cavity array.
Official Gazette of the U.S. Patent and Trademark Office

N81-14188# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany). Inst. fuer Hochfrequenztechnik.
MULTIPATH INDUCED ERRORS, NONSTATISTICAL CORRECTION OF POSITION ERRORS, CORRECTION OF PROPAGATION ANOMALIES
Fritz Stelzel May 1979 128 p refs In GERMAN; ENGLISH summary Report will also be announced as translation (ESA-TT-667)
(DFVLR-Mitt-79-17) Avail: NTIS HC A07/MF A01; DFVLR, Cologne DM 21,20

Considerations to reduce multipath induced errors in a sense to depreciate the disparity between true and erroneous position are discussed. New possibilities for improving location errors are indicated, making it possible to distinguish between incorrect and correct position data. S.F.

N81-14189# Royal Netherlands Meteorological Inst., De Bilt. Fysisch Meteorologisch Onderzoek.
ESTIMATES OF INCOMING SHORTWAVE RADIATION AND NET RADIATION FROM STANDARD METEOROLOGICAL DATA
A. A. M. Holtslag and A. P. vanUlden 1980 24 p refs Sponsored by Neth. Min. of Public Health and Environ. Hyg.
(KNMI-WR-80-6) Avail: NTIS HC A02/MF A01

It was shown that incoming shortwave radiation can be estimated relatively accurately from solar elevation and total cloud cover only. Furthermore, from incoming shortwave radiation, albedo, total cloud cover and screen temperature the net radiation can be estimated by day, with a fair accuracy. In the night the radiation can be estimated, but not very accurately, from the observed windspeed and total cloud cover. Author

N81-14190# Helsinki Univ. of Technology, Otaniemi (Finland). Radio Lab.
[ACTIVITIES OF THE RADIO LABORATORY, 1977] Annual Report
Martti Tiuri, ed. 1978 34 p refs
(REPT-S-110; ISBN-951-751-358-5) Avail: NTIS HC A03/MF A01

The laboratory is active in the fields of electromagnetic theory and techniques, microwave applications, and radio science research and instrumentation. Other topics include circuit theory and computer aided design. The station has a 14 m precision radio telescope for millimeter wave research. E.D.K.

N81-14191# Helsinki Univ. of Technology, Otaniemi (Finland). Radio Lab.
CALCULATION OF TRAVELING-WAVE WIRE ANTENNA ARRAYS WITH MUTUAL IMPEDANCES
Johan Henriksson 1978 44 p refs
(REPT-S-111; ISBN-951-751-557-X) Avail: NTIS HC A03/MF A01

An approximate method for computing the current distribution in a periodic waveguide antenna is presented. The current of an antenna element was corrected by taking into account coupling effects between adjacent elements. A 2 GHz grid antenna with low sidelobes is presented as an example. T.M.

N81-14192# Research Inst. of National Defence, Stockholm (Sweden).
DATA OBTAINED IN RADIOWAVE PROPAGATION EXPERIMENTS ON THE PATH KIRUNAI STOCKHOLM
Mats Broems, Lars Baecklund, and Rune Lindquist May 1980 25 p
(FOA-C-30187-E2) Avail: NTIS HC A02/MF A01

In order to study different ionospheric conditions, signals received from a pulsed transmitter over a 19 year period were recorded continuously on film with a time resolution of a few minutes, and with a resolution in the time of arrival of simultaneous pulses of about 100 micron s. The density of the echoes provides a rough indication of the signal amplitude. An example of the records and the evaluated parameters is given and the measuring system is described. A.R.H.

N81-14193# Fondazione Ugo Bordoni, Rome (Italy).
TELEPHONE NETWORK BEHAVIOR IN REPEATED ATTEMPTS ENVIRONMENT: A SIMULATION ANALYSIS
Davide Grillo Jun. 1979 10 p refs Presented at 9th Intern. Teletraffic Congr., Torremolinos, Spain, 17-24 Oct. 1979
(FUB-15-1979; RIF-3C0779) Avail: NTIS HC A02/MF A01

Due to the side diffusion of DDD service and SPC switching, national and international telephone networks are very sensitive to situations arising from departure from normal conditions (overloads). In order to ensure maximum network call carrying capacity under these conditions, network management actions must be taken. A model for investigating the effectiveness of a restrictive network management action is described in which overflow traffic is prevented from accessing network resources when predetermined occupancy levels are reached. The repeated attempts phenomenon and queueing and time-out mechanism in the switching centers are taken into account. E.D.K.

N81-14194# Technische Hogeschool, Delft (Netherlands). Dept. Aerospace Engineering.
DIGITAL DATA REDUCTION ALGORITHM FOR OSCILLATORY SIGNALS WITH AN APPLICATION TO L-INSTABILITY
F. Bebelaar, B. A. C. Ambrosius, and H. F. R. Schoeyer Apr. 1980 105 p ref
(VTH-LR-298) Avail: NTIS HC A06/MF A01

The algorithm was developed to analyze pressure histories that occur during L-instability in solid propellant rocket motors, but the method is of a general nature and may also be applied for analysis of other signals containing oscillatory components. It recognizes and evaluates those oscillations that are considered to be significant by means of criteria for the absolute and relative oscillatory amplitudes that are considered to be important in comparison with noise. Therefore, the basic algorithm to recognize and evaluate the oscillatory components, is applicable to any arbitrary signal. The effects of assigning specific values to the criteria to distinguish between noise and information, can be visualized by an optional procedure which plots the signal, indicating all those extremes that were identified by the program as being important. The program was written in ALGOL 60. Flow charts and diagrams that facilitate translations into other languages are presented. T.M.

N81-14195# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany). Inst. fuer Hochfrequenztechnik.
VOLUMETRIC PATTERN PREDICTION OF ANTENNAS ON AIRCRAFT USING THE GEOMETRICAL THEORY OF DIFFRACTION Ph.D. Thesis - Kaiserslautern Univ.
Thomas Jank Nov. 1979 178 p refs In GERMAN; ENGLISH summary Report will also be announced as translation (ESA-TT-677)
(DFVLR-FB-80-01; TT-677) Avail: NTIS HC A09/MF A01

The patterns of small dipoles or slot antennas mounted on the fuselage of an aircraft are computed in the high frequency case. For the computation of the field the geometrical theory of diffraction is used. A very versatile and realistic mathematical aircraft mode is developed. The construction of all rays which contribute considerably to the total field is a complicated numerical problem. Via the solution of this ray tracing problem it is possible to obtain arbitrary pattern cuts. Author

N81-14196# Pacific-Sierra Research Corp., Santa Monica, Calif.
IMPROVED NOISE SUPPRESSION FOR MULTIBAND IMAGERY Final Report
P. J. Ready, D. A. Anderson, and B. J. Gaitley Aug. 1980 27 p
(Contract F49620-78-C-0059; AF Proj. 2304)
(AD-A091815; PSR-1028; AFOSR-80-1134TR) Avail: NTIS HC A03/MF A01 CSCL 09/2

This research has developed and tested an approach to improvement of noise degraded multiband imagery based on a class dependent Karhunen-Loeve (K-L) transformation and

transform domain spatial filtering. The technique is attractive because of its tendency to preserve the high spatial frequency information (e.g., edges) in the picture as compared with conventional minimum mean square error linear filtering of the original bands. Multiband images (especially color and multispectral characteristically exhibit significant class structure, and within a particular class show high spectral correlations. The filtering technique developed during this research exploits both the class structure and the intraclass correlation to achieve noise suppression. GRA

N81-14197# Signatron, Inc., Lexington, Mass.
ADAPTIVE ANTENNA CONTROL (AAC) PROGRAM Final Report, Jun. 1978 - Mar. 1980
Peter Monsen and Steen Parl Aug. 1980 159 p refs
(Contract DAAB07-76-C-8085; DA Proj.1X7-63707-D-245)
(AD-A091764; A212; CSA-76-8085-F) Avail: NTIS HC A08/MF A01 CSCL 09/5

A theoretical and empirical investigation of angle diversity for application on Defense Communications System (DCS) tropospheric scatter communication links has been completed. The major results are: (1) development of a new propagation prediction model applicable at frequencies up to 5 GHz; (2) development of a modem prediction model for calculating the bit error rate and fade outage on a fading multipath channel for the MD-918/GRC modem; (3) a trade-off analysis to determine the optimum angle diversity system; (4) design and development of a 4.4-5.0 GHz (C-Band) angle diversity feedhorn which gives a beam separation within about 1/2 dB of optimum; (5) theoretical and empirical evidence that angle diversity has a performance advantage over frequency diversity; (6) discovery of reduced correlation effects in angle diversity when wideband signals are employed; and (7) development of a methodology and a statistical base for development of future angle diversity sytems. GRA

N81-14198# Wisconsin Univ. - Madison.
TROPOSCATTER ANTENNA POSITIONER Final Technical Report, Sep. 1977 - Feb. 1980
W. P. Birkemeier and A. B. Fontaine Griffiss AFB, N.Y. RADC Aug. 1980 282 p refs
(Contract F30602-77-C-0148; AF Proj. 4519)
(AD-A091778; RADC-TR-80-275) Avail: NTIS HC A13/MF A01 CSCL 09/5

This report covers results of a contract to provide for a rapid and accurate alignment procedure of troposcatter antennas. An experimental model embodying a microprocessor based computation routine at the receive antenna and a stable transmitted frequency allows for alignment of antennas along the great circle path. The test data show that an alignment accuracy of better than plus or minus 1/3 degree or approximately plus or minus 1/10 of a beamwidth could be accomplished in approximately 10 minutes. GRA

N81-14199# Naval Ocean Systems Center, San Diego, Calif.
AEGIS NEAR-FIELD ANTENNA TEST SYSTEM, AUTOMATED TEST SYSTEM FOR PHASED ARRAY ANTENNAS Final Report, 3 Oct. 1977 - 30 Dec. 1978
Levi L. Coulter, Jr., Wayne A. Harmening, James C. Kulp, and Robert L. Mather Jun. 1980 124 p refs
(AD-A091697; NOSC/TR-499; NAVSEA-MT-S-475-77) Avail: NTIS HC A06/MF A01 CSCL 17/9

RCA has recently developed two major elements of an automated testing system for phase array antennas. The testing system applies the near-field technique for production acceptance test of the AEGIS AN/SPY-1A Phased Array Antenna. The two elements developed are (1) the programmed scanner and (2) the computer programs for real-time control, beamformer alignment, calibration, data reduction, and test results display. The programmed scanner scans the rf probe over an area 600 centimeters wide and 550 centimeters high in a raster fashion. Typical probe scanning velocities are: 15 centimeters per second moving vertically upward during data collection, and 10 centimeters per second moving horizontally (either step or continuous). Probe position accuracies achieved are 0.016 centimeters RMS (X) 0.019 centimeters RMS (Y), and 0.011 centimeters RMS (Z), where (X,Y) is the plane of probe motion and (Z) is normal to that plane. Features of the computer program are program-directed calibration routines interacting with the test conductor, test conductor selected test scenarios that beamformer waveguide length corrections for antenna phase alignment. GRA

N81-14200# Kentucky Univ., Lexington. Dept. of Electrical Engineering.
APPLICATIONS OF MULTICONDUCTOR TRANSMISSION LINE THEORY TO THE PREDICTION OF CABLE COUPLING: VOLUME 8. PREDICTION OF CROSS TALK INVOLVING BRAIDED SHIELD CABLES
Clayton R. Paul Griffiss AFB, N.Y. RADC Aug. 1980 257 p refs
(Contracts F30602-79-C-0011; F30602-78-C-0120; AF Proj. 2338)
(AD-A091751; RADC-TR-76-101-Vol-8) Avail: NTIS HC A12/MF A01 CSCL 09/1

The contents of this report are concerned with the electromagnetic coupling (crosstalk) between braided-shield cables. The effect of pigtails (exposed sections of braided-shield cables in which the shield is stripped back exposing the interior wire) on crosstalk was investigated. It was found that even though the length of these exposed sections constitutes only a very small fraction of the total line length the dominant coupling to the shielded cable can occur via these pigtail sections. If the pigtail sections are eliminated, an additional reduction in crosstalk of as much as 30dB may be realized. The modeling and prediction of this crosstalk was also investigated. A low-frequency model provided accurate predictions for electrically short lines. The multiconductor transmission line (MTL) model was also formulated. The MTL model provided predictions within 1-3dB for electrically short lines and within 6-10dB when the line was electrically long. GRA

N81-14201# Naval Ocean Systems Center, San Diego, Calif.
STRAGETIC LASER COMMUNICATIONS PROGRAM. VOLUME 1: PROCEEDINGS OF THE NAVY/DARPA FOURTH TECHNICAL INTERCHANGE MEETING
31 Jul. 1980 639 p refs Meeting held at San Diego Calif., 25-27 Mar. 1980; sponsored by Naval Electronics Systems Command DARPA, and ONR
(AD-A091619; NOSC/TD-352-Vol-1) Avail: NTIS HC A99/MF A01 CSCL 17/2

Partial contents: OSCAR spaceborne system--phase IB; Subsystem Technology--Cesium atomic resonance filter studies; Birefringent blue-green filters, Iso-index electro-optic filter, Christiansen-Bragg filters, Thermal control for hole-burning filter, and Non-linear optical phase conjugation for SLC uplink; Space-Based Laser--Status of blue-green discharge laser work at NRL, Efficient Raman conversion of XeCl laser into the blue-green region, Lead vapor conversion of an X-ray preionized XeCl laser, Excimer laser engineering development at LASL, UTRC blue-green laser research, Mercury bromide laser scaling approaches, Parameterization studies of HgBr lasers, HgBr2/HgBr dissociation laser, Efficient conversion of XeF* radiation to the blue-green through SRS, Scaling studies of efficient Raman converters, Ground based XeCl-Pb blue-green source, Tunable blue-green laser development, XeCl lasers for blue-green conversion, Electron beam excited blue-green XeF, and copper laser development; Channel Characterization--Downlink laser cloud propagation experiments, The temporal and spatial smearing of blue-green pulses in clouds, and Kauai cloud experiment measurements: O2 absorption techniques. GRA

N81-14202# Network Analysis Corp., Vienna, Va.
COMMUNICATIONS SUPPORT FOR FLIGHT DATA ENTRY AND PRINTOUT TERMINALS Final Report
Aug. 1980 246 p refs
(Contract DOT-FA79-WA-4335)
(AD-A091580; NAC/FR-303-B/01; FAA-RD-80-96) Avail: NTIS HC A11/MF A01 CSCL 17/2

The FDEP service, as it is to be upgraded under the FDIO Program, was analyzed to determine the optimal communications support strategy. That analysis yielded the following conclusions: integration of FDEP into NADIN is more economical than independent operation of FDEP, provision of local switching for FDEP messages in the NADIN concentrators should prove economical as more services are absorbed by NADIN, and procurement of FDIO equipment that would not be used when

FDEP is integrated into NADIN should be avoided unless the timely upgrading of FDEP would be otherwise jeopardized. The analysis also produced detailed designs for local access FDEP circuits and identified specific enhancements required for NADIN if FDEP is to be absorbed. GRA

N81-14203# Swedlow, Inc., Garden Grove, Calif.
MANUFACTURING METHODS AND TECHNOLOGY (MM/T) PROJECT TO ESTABLISH PRODUCTION TECHNIQUES TO MANUFACTURE RIGID ARMOR FOR RADAR ANTENNA HARDENING Quarterly Report, 1 Oct. 1979 - 31 Mar. 1980
G. Cook Mar. 1980 22 p refs
(Contract DAAB07-77-C-0476)
(AD-A091863; SI-ER-915-8/9; QR-8/9) Avail: NTIS HC A02/MF A01 CSCL 19/4

Modification of contract was received September 1979 after a six month limited activity period due to depletion of the majority of the original funding. Limited activity period involved preparation of the seventh quarterly report and optimizing molding procedures and molding panels during the production demonstration for AMMRC. Project continuation is based on reduced effort to supply a limited number of Engineering and Confirmatory Samples and provide a Production Capability Demonstration. Pilot run has been eliminated. The fabrication procedures will conform to the method of production demonstrated at Swedlow, Inc. to AMMRC personnel in May 1979. This period included fabrication of Engineering Samples within the guidelines established during the demonstration run in May, 1979. Run data sheets were analyzed to determine process revisions required to assure replication of final thickness from panel to panel. GRA

N81-14204# Range Commanders Council, White Sands Missile Range, N. Mex. Electronic Trajectory Measurements Group.
ERROR SOURCES APPLICABLE TO PRECISION TRAJECTORY RADAR CALIBRATION Final Report
1980 22 p refs Supersedes ETMG-117-69
(AD-A091654; ETMG-117-80; ETMG-117-69) Avail: NTIS HC A02/MF A01 CSCL 17/9

The purpose of this document is to identify possible sources of error in measurements by land-based monopulse and phased array radar systems. Recognition of these error sources will be useful in several ways. Operations personnel will be able to more easily recognize deficiencies in calibration procedures and utilize existing procedures more proficiently to minimize calibration errors. System design/procurement engineers will be reminded of potential error sources enabling more realistic design and acceptance specifications to be written for future equipments. Planning groups will be able to identify the limitations which affect the applications of the radar. Those engaged in operations engineering may utilize this document as an aid in identifying those modifications which would be more beneficial in improving the performance or accuracy of operational radar systems. In addition, data reduction personnel will be aided in the evaluation of the total effects of current and/or proposed data reduction and analysis techniques of radar data by recognizing the source and in some cases the magnitude of system bias errors. GRA

N81-14205# Naval Ocean Systems Center, San Diego, Calif.
EVAPORATION DUCT EFFECTS ON MAXIMUM INTERCEPT RANGE FOR 18-1 AND 37.5-GHz EMITTERS. A THEORETICAL ANALYSIS OF EXPECTED FREQUENCY DISTRIBUTIONS OF INTERCEPT RANGE FOR FIVE OCEANIC AREAS Final Report, Dec. 1979 - Sep. 1980
H. V. Hitney 30 Sep. 1980 196 p
(AD-A091724; NOSC/TR-582) Avail: NTIS HC A09/MF A01 CSCL 20/14

The effect of the evaporation duct on maximum intercept range of 18 and 37.5 GHz emitters is modeled. Results show that ranges for high-power emitters or high sensitivity receiver systems are greatly affected, while ranges for low power emitters are not. Optimum shipboard receiver heights are determined for each frequency. Comparisons of some modeled results to observed data are included. GRA

N81-14206# Naval Research Lab., Washington, D. C. Radar Analysis Branch.
SOME ERROR PROBABILITIES FOR THE ASSOCIATION OF PASSIVE DF MEASUREMENTS WITH RADAR RETURNS Interim Report
J. O. Coleman 21 Oct. 1980 58 p refs
(ZF12151001)
(AD-A091659; NRL-8443) Avail: NTIS HC A04/MF A01 CSCL 17/9

An important problem in multiple-sensor integration is the correct association of data from different sensors with the same target. This report considers a family of four discriminants for associating a set of measurements from a passive DF system with one of the radar targets being tracked by a surveillance radar system. This association involves choosing the radar target that will minimize a discriminant which is a function of the DF data and data on that radar target. The discriminants considered here are sums of squared differences of independent unbiased Gaussian measurements of bearings to stationary targets. Because data generally arrive from the different sensors asynchronously, it is becoming common practice with this type of system to smooth (average together) the radar data, the DF data, or both prior to use in the discriminant. This report attempts to provide a basis for deciding which smoothing option is most appropriate by giving the error probabilities for each of these three smoothing options and for the option of no smoothing. GRA

N81-14207# Serendipity, Inc., Sherman Oaks, Calif.
AN ANALYSIS OF THE CHARACTERISTICS OF RAYLEIGH WAVES PRODUCED BY SURFACE EXPLOSIONS Final Report, 5 Jul. 1977 - 31 Jan. 1979
J. R. Murphy 31 Jan. 1979 70 p refs
(Contract DNA001-77-C-0272)
(AD-A091806; DNA-4826-F) Avail: NTIS HC A04/MF A01 CSCL 08/11

The successful deployment of an MX missile system requires a careful consideration of ground shock effects which were of secondary importance in previous applications. For example, with the system sited in a valley and under a multiple attack scenario, untargeted points can be expected to experience a significant ground motion environment as a result of the superposition of motions originating from attacks on a variety of surrounding aimpoints. Furthermore, reflections of outgoing energy from the valley boundaries can be expected to complicate the ground motion environment within the valley, particularly at late times. The objective of the work described in this report has been to develop a better quantitative understanding of these late time, long period ground motions in order to provide a firmer basis for scaling to new geologic conditions. Particular emphasis has been placed on the identification of the characteristic mode of propagation associated with these arrivals. A theoretical model is described which has been used to compute the surface waves produced by a propagating airblast load acting on the surface of a multilayered, elastic half-space. This model was then applied to the analyses of both the observed data and finite difference simulations of the Pre-Mine Throw and Pre-Dice Throw 100 tone HE surface blasts. In addition, a preliminary assessment has been made of the influence of valley boundaries on the late time ground motion environment within the valley. GRA

N81-14208# BDM Corp., McLean, Va.
MEASUREMENTS OF MICROWAVE TRANSMISSION CHARACTERISTICS THROUGH VARIOUS CONFIGURATIONS OF FLUIDIZED BED MATERIALS Final Report
16 May 1980 27 p
(Contract METC-80-C-0001)
(DOE/MC-14143/T1) Avail: NTIS HC A02/MF A01

The feasibility of developing a microwave diagnostic system for measurement of bubbles in a fluidized bed combustion system was experimentally investigated. Experiments were performed in a simple waveguide geometry using microwave frequencies from 2.4 to 3.9 GHz. Styrofoam spacers were used to simulate bubbles in bed materials, such as Greer limestone. The results show that it is feasible to develop a diagnostic system based on microwave transmission through a system consisting of gaps in a limestone media, such as a fluidized bed. The gap is shown to perturb the transmitted power, and to be very sensitive to bubble and bed material dimensions. Resonance effects are shown to occur when dimensions are integer multiples of a quarter wavelength. DOE

N81-14209# National Technical Information Service, Springfield, Va.
SINGLE SIDEBAND COMMUNICATIONS. CITATIONS FROM THE NTIS DATA BASE Progress Report, 1964 - Jun. 1980
William E. Reed Aug. 1980 176 p Supersedes NTIS/PS-79/0760; NTIS/PS-78/0733
(PB80-814262; NTIS/PS-79/0760; NTIS/PS-78/0733) Avail: NTIS HC $30.00/MF $30.00 CSCL 17B

Federally sponsored research on single sideband communication equipment and systems is presented. Reports on the design, development, and operation are cited. Studies on single sideband transmission, modulation, and single processing are included. GRA

N81-14210# National Technical Information Service, Springfield, Va.
SINGLE SIDEBAND COMMUNICATIONS. CITATIONS FROM THE ENGINEERING INDEX DATA BASE Progress Report, 1970 - Jun. 1980
William E. Reed Aug. 1980 216 p Supersedes NTIS/PS-79/0761; NTIS/PS-78/0734
(PB80-814270; NTIS/PS-79/0761; NTIS/PS-78/0734) Avail: NTIS HC $30.00/MF $30.00 CSCL 17B

The bibliography cites reports from worldwide research on single sideband communication equipment and systems. Reports on the design, development, and operation are presented. Studies on single sideband transmission and signals are included. This updated bibliography contains 211 citations, 25 of which are new entries to the previous edition. DOE

N81-14211# Stanford Univ., Calif. Communications Satellite Planning Center.
USE OF AMPLITUDE COMPANDORED SSB IN THE MOBILE RADIO BANDS Final Report
Bruce B. Lusignan Jul. 1980 31 p refs
(Contract FCC-PO-0245)
(PB80-215759; SU-TR-29; FCC/PRB/PDD-80/09) Avail: NTIS HC A03/MF A01 CSCL 17B

In response to the pressing concern over growing demand for scarce UHF spectrum, the Federal Communications Commission established the UHF Task Force to determine whether the existing mobile radio bands could be used more effectively in order to allow more traffic in the existing bands. This study revealed that up to 5 times more channels could be created in existing mobile radio bands, using technology that is available today. In particular, this technology uses the amplitude modulated, single sideband mode of emission (A3A) in conjunction with specialized circuits. The specialized circuits improved the techniques' compatibility with mobile use. The research program is summarized and discussions of comparative performance of frequency modulation (FM) and amplitude compandored single sideband (ACSB) radios are included. GRA

N81-14212# Stanford Univ., Calif. Communications Satellite Planning Center.
USE OF AMPLITUDE COMPANDORED SSB IN THE MOBILE RADIO BANDS Progress Report
Bruce B. Lusignan Jan. 1980 69 p 9 Vol.
(PB80-215791; FCC/PRB/PDD-80/14) Avail: NTIS HC A04/MF A01 CSCL 17B

Progress is reported on FCC funded research on single sideband radios. Frequency modulation (FM) and amplitude compandored single sideband (ACSB) radios are compared with respect to performance, probability of message completion, interference protection ratios, intermodulation interference, and transmitter power requirements. GRA

N81-14213# Stanford Univ., Calif. Communications Satellite Planning Center.
CONVENIENCE CIRCUITS
Bruce B. Lusignan Jun. 1980 28 p refs Sponsored by Federal Communications Commission 9 Vol.
(PB80-215783; SU-TR-30; FCC/PRB/PDD-80/12) Avail: NTIS HC A03/MF A01 CSCL 17B

The final convenience circuits designs for amplitude compandored single sideband (ACSB) radios are described. The circuits are those that research and systems analysis indicate would be the best to manufacture in a single large scale integrated circuit (LSI) chip. The circuit incorporates the features tested in the research program plus extra features felt important to include to make the chips convenient for a wide-range of applications. These features include pre-emphasis and de-emphasis, amplitude companding, automatic microphone level control, audio shaping, automatic receiver gain control, automatic frequency control by pilot tone, and tone activated squelch control. GRA

N81-14214# Stanford Univ., Calif. Communications Satellite Planning Center.
ANALYSIS, DESIGN, AND PERFORMANCE EVALUATION OF A SINGLE CHANNEL ACSB SYSTEM
Fernando Nocedal May 1980 229 p refs Sponsored by Federal Communications Commission
(PB80-215775; SU-TR-27; FCC/PRB/PDD-80/11) Avail: NTIS HC A11/MF A01 CSCL 17B

The analysis and design of a single channel, single sideband (SSB) radio system is treated with special emphasis on the intermodulation performance of such a system. In particular, the characteristics of speech relevant to SSB, and the performance of amplitude compandored single sideband (ACSB) radios based upon both analytic and empirical results are addressed. GRA

N81-14215# Stanford Univ., Calif. Communications Satellite Planning Center.
SPECTRAL EFFICIENCY OF FM AND ACSB RADIOS
Mark Herro May 1980 115 p refs Sponsored by Federal Communications Commission
(PB80-215767; SU-TR-26; FCC/PRB/PDD-80/10) Avail: NTIS HC A06/MF A01 CSCL 17B

The spectral efficiency of amplitude compandored single sideband (ACSB) radios is compared with that of conventional frequency modulation (FM) radios utilizing five kilohertz frequency deviation. The comparison is made analytically through statistical models and computer simulation by addressing performance in radio interference dominated environments. Adjacent channel interference and co-channel interference in conjunction with channel separation and transmitter separation are addressed along with interference to FM radios caused by ACSB radios, interference to ACSB radios, by FM radios and interference of radios using the same modulation scheme on each other. GRA

N81-14216# Middleton (David), New York.
THRESHOLD SIGNAL RECEPTION IN ELECTROMAGNETIC INTERFERENCE ENVIRONMENT. PART 1: PROBLEMS AND APPROACHES
David Middleton Jul. 1980 49 p refs
(PB80-218753; NTIA/CR-80-8) Avail: NTIS HC A03/MF A01 CSCL 17B

In this study the problem described is of relating receiver range and conditions of threshold reception, the channel, criteria of performance, etc., for various classes of desired signals in general electromagnetic interference (EMI) environments. Methods for obtaining quantitative solutions are outlined. GRA

N81-14217# Federal Communications Commission, Washington, D. C. Policy Development Div.
RHYME TEST PERFORMANCE OF ACSB (AMPLITUDE COMPANDORED SINGLE SIDEBAND), NARROW BAND, AND FM RADIOS
Philip Wala Mar. 1980 22 p refs
(PB80-215932; FCC/PRB/PDD-80-13) Avail: NTIS HC A02/MF A01 CSCL 17B

In this fifth of nine reports concerning spectrum efficient technologies, amplitude compandored single sideband (ACSB) radios and narrowband (NB) radios using amplitude and frequency compandors are compared with conventional frequency modulation (FM) radios by using the Dynastat Corporation's diagnostic rhyme test (DRT). This test provides a measure of the intelligibility of a received signal based on listener identification of initial consonant sounds of single syllable words. The test also provides subjective ratings of several aspects of signal quality based on listeners' personal preference. GRA

N81-14218# National Technical Information Service, Springfield, Va.
LIGHT COMMUNICATION SYSTEMS. CITATIONS FROM

THE NTIS DATA BASE Progress Report, 1979 - Aug. 1980
William E. Reed Sep. 1980 92 p Supersedes NTIS/PS-79/0998 and NTIS/PS-78/0873
(PB80-815319; NTIS/PS-79/0998; NTIS/PS-78/0873) Copyright. Avail: NTIS HC $30.00/MF $30.00 CSCL 17B

The design, performance, and application of laser, infrared, and visual communication systems are covered in the cited research reports. Transmission and equipment studies for space, atmospheric, and underwater light communication are presented. Topics covered include lasers, fiber optics, signal processing, transmission links, and data transmission. This updated bibliography contains 87 citations, 59 of which are new entries to the previous edition. GRA

N81-14219*# New Mexico Univ., Albuquerque. Technology Application Center.
HORN ANTENNA DESIGN STUDIES. CITATIONS FROM THE INTERNATIONAL AEROSPACE ABSTRACT DATA BASE Progress Report, 1974 - Aug. 1980
Mary K. Gallagher Sep. 1980 50 p Supersedes NTIS/PS-79/1018 Sponsored by NASA and NTIS
(NASA-CR-163820; PB80-815962; NTIS/PS-79/1018) Avail: NTIS HC $30.00/MF $30.00 CSCL 17B

These citations from the international literature describe the antenna radiation patterns, polarization characteristics, wave propagation, noise temperature, wave diffraction, and wideband communication of various horn antennas. This updated bibliography contains 217 citations, 63 of which are new entries to the previous edition. DOE

33 ELECTRONICS AND ELECTRICAL ENGINEERING

Includes test equipment and maintainability; components, e.g., tunnel diodes and transistors; microminiaturization; and integrated circuitry.

For related information see also *60 Computer Operations and Hardware* and *76 Solid-State Physics*.

N81-14220* National Aeronautics and Space Administration. Pasadena Office, Calif.
BASE DRIVE FOR PARALLELED INVERTER SYSTEMS Patent
Satoshi Nagano, inventor (to NASA) (JPL, California Inst. of Tech., Pasadena) Issued 9 Sep. 1980 5 p Filed 16 Feb. 1978 Supersedes N78-22376 (16 - 13, p 1705) Sponsored by NASA
(NASA-Case-NPO-14163-1; US-Patent-4,222,098; US-Patent-Appl-SN-878541; US-Patent-Class-363-71; US-Patent-Class-363-56; US-Patent-Class-363-78) Avail: US Patent and Trademark Office CSCL 09C

In a paralleled inverter system, a positive feedback current derived from the total current from all of the modules of the inverter system is applied to the base drive of each of the power transistors of all modules, thereby to provide all modules protection against open or short circuit faults occurring in any of the modules, and force equal current sharing among the modules during turn on of the power transistors.
Official Gazette of the U.S. Patent and Trademark Office

N81-14221* National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
SYSTEM FOR A DISPLAYING AT A REMOTE STATION DATA GENERATED AT A CENTRAL STATION AND FOR POWERING THE REMOTE STATION FROM THE CENTRAL STATION Patent
James C. Perry, inventor (to NASA) Issued 14 Oct. 1980 9 p Filed 30 Nov. 1978 Supersedes N79-14308 (17 - 05, p 0590)
(NASA-Case-GSC-12411-1; US-Patent-4,228,422; US-Patent-Appl-SN-965367; US-Patent-Class-340-310A; US-Patent-Class-340-309.4; US-Patent-Class-340-310R; US-Patent-Class-340-870.24; US-Patent-Class-370-85; US-Patent-Class-368-47) Avail: US Patent and Trademark Office CSCL 09C

A system for displaying at a remote station data generated at a central station and for powering the remote station from the central station is presented. A power signal is generated at the central station and time multiplexed with the data and then transmitted to the remote station. An energy storage device at the remote station is responsive to the transmitted power signal to provide energizing power for the circuits at the remote station during the time interval data is being transmitted to the remote station. Energizing power for the circuits at the remote station is provided by the power signal itself during the time this signal is transmitted. Preferably the energy storage device is a capacitor which is charged by the power signal during the time the power is transmitted and is slightly discharged during the time the data is transmitted to energize the circuits at the remote station. Official Gazette of the U.S. Patent and Trademark Office

N81-14222*# Radio Corp. of America, Camden, N. J.
FETSIM USER'S MANUAL AND EXAMPLE
Aug. 1978 39 p refs
(Contract NAS8-31325)
(NASA-CR-150800) Avail: NTIS HC A03/MF A01 CSCL 09C

A batch program written in FORTRAN IV which does D.C. and transient analysis of MOS circuits is presented. Circuits employing N-MOS transistors and/or P-MOS transistors in either a bulk technology or an SOS technology, or almost any combination of R-C elements may be analyzed. The program requires as input data the complete circuit topology, device parameters, process parameters, and control parameters. The user can specify initial node conditions and the input pulse format. For example, pulse rise time, fall time, width and time between succeeding pulses are all independently controllable. The program contains a sophisticated mathematical model that can accurately handle either NMOS, P-MOS, Bulk or SOS devices. Sensitivity to process changes is maintained by requiring such process parameters as threshold voltage and doping level as program inputs. A.R.H.

N81-14223# Helsinki Univ. of Technology, Otaniemi (Finland). Radio Lab.
ON THE CORRESPONDENCE BETWEEN TWO-DIMENSIONAL REAL VECTOR FUNCTIONS AND FUNCTIONS OF A COMPLEX VARIABLE AND ITS APPLICATION IN ELECTROMAGNETICS
Ismo V. Lindell 1979 23 p refs
(REPT-S-112; ISBN-951-751-558-8) Avail: NTIS HC A02/MF A01

The correspondance between two dimensional real vector functions and functions of a complex variable, frequently applied in electromagnetics in a heuristic manner, is established through two mappings. It is demonstrated that these mappings can be applied at any stage of calculation to switch from one notation to the other. The properties of the mappings are studied in terms of simple examples. Author

N81-14224# Siemens A.G., Munich (West Germany). Werk Halbleiter.
PLANAR TRANSISTORS AND IMPATT DIODES WITH ION IMPLANTATION Final Report
Heinz Dorendorf, Hans Glawischnig, Leo Grasser, and Juergen Hammerschmitt Bonn Bundesministerium fuer Forschung und Technologie Oct. 1979 60 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-79-16; ISSN-0340-7608) Avail: NTIS HC A04/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 12,20

Low frequency planar npn and pnp transistors were developed in which the base and emitter were fabricated using ion implantation of boron and phosphorous by a drive in diffusion. Electrical parameters of the transistors are comparable with conventionally produced transistors; the noise figure was improved and production tolerances were significantly reduced. Silicon impatt diodes for the microwave range were also fabricated with implanted pn junctions and tested for their high frequency characteristics. These diodes, made in an improved upside down technology, delivered output power up to 40 mW (burn out

power) at 30 GHz. Reverse leakage current and current carrying capability of these diodes were comparable to diffused structures. Author

N81-14225# AEG-Telefunken, Heilbronn (West Germany). Geschaeftsbereich Halbleiter.
DEVELOPMENT OF HIGH COMPLEXITY LINEAR INTEGRATED CIRCUITS Final Report
Bernd Eichler Oct. 1979 60 p In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-79-36; ISSN-0340-7608) Avail: NTIS HC A04/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 12,20

The essential requirements for an economical production of the linear integrated bipolar circuits of high complexity are described. The results of fundamental investigations to that object as well as general failure reasons are discussed. The development of several complex integrated circuits is also described with emphasis on specific optimization steps. Typical examples are given which explain the measurement technique of these circuits. R.C.T.

N81-14226# Siemens A.G., Munich (West Germany). Research Lab.
LARGE-SCALE INTEGRATED MOS CIRCUITS WITH SMALL DIMENSIONS. PREPARATION OF THIN FILMS Final Report
Dietrich Widmann Bonn Bundesministerium fuer Forschung und Technologie Nov. 1979 48 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-79-55; ISSN-0340-7608) Avail: NTIS HC A03/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 9,65

Results obtained by step-and-repeat projection printing are reported emphasizing the resolution capability, the overlay precision, and the defect density. Several functioning integrated circuits with minimum dimensions of 1.5 micrometers could be manufactured using the step-and-repeat projection printing. Additionally, a process for the evaporation of aluminum/copper/silicon films and a process for the bias sputtering of silicon dioxide films are reported. Both processes are applied to complex integrated circuits with small dimensions. Author

N81-14227# Siemens A.G., Munich (West Germany). Unternehmensbereich Bauelemente und Zentralbereich Technik.
INTEGRATED RC-CIRCUITS IN ALTA-TECHNOLOGY ON ONE SUBSTRATE Final Report
Helmold Kausche, Wolf-Dieter Muenz, and Hans Werner Poetzlberger Bonn Bundesministerium fuer Forschung und Technologie Dec. 1979 60 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-79-107; ISSN-0340-7608) Avail: NTIS HC A04/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 12,60

To reach the goals of this program - i.e., the realization of integrated RC circuits in AlTa-technology on one substrate - two ways were investigated: first the 'single layer technique' with resistors and capacitors from one layer and then the 'double layer technique' with a Ta-rich layer for the resistors and an Al-rich layer for the capacitors. The compensation of temperature coefficients of R and C is done by reactive sputtering (AlTa-O) or by use of a sandwich dielectric of AlTa-oxide and SiO2. The double layer technique was optimized with production equipment and reached preproduction standards. Samples of highly stable RC-circuits (active filters) were realized. The technology also includes the integration of crossovers. Author

N81-14228# AEG-Telefunken, Heilbronn (West Germany). Geschaeftsbereich Halbleiter.
DEVELOPMENT OF TECHNICAL INTEGRATED CIRCUITS Final Report
Ingo Hagenloch Bonn Bundesministerium fuer Forschung und Technologie Nov. 1979 51 p In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-79-41; ISSN-0340-7608) Avail: NTIS HC A04/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 10,30

Results of the development of technical integrated circuits as performed in the years 1972 unitl 1974 are published. The following monolithic integrated circuits were developed: two touch switches for mode and channel setting in radio or TV receivers; a phase control and zero crossing switch to drive SCR's or Triacs; a directional and warning circuit for application in motor vehicles or as a pulse generator; an automatic seat belt interlock system; a timer for electronic watches; and a light dimmer with touch control. L.F.M.

N81-14229# AEG-Telefunken, Ulm (West Germany).
SEMICONDUCTOR CROSSPOINTS FOR DIRECT REPLACEMENT OF ELECTROMECHANICAL SWITCHES WITH HIGH VOLTAGE REQUIREMENTS Final Report
Erich Baechle, Reinhard Becker, Helmut Knapp, Max Kuisl, Friedrich Laemmel, Bernhard Rall, Klaus Schlueter, and Hans Schuessler Bonn Bundesministerium fuer Forschung und Technologie Nov. 1979 166 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-79-44; ISSN-0340-7608) Avail: NTIS HC A08/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 34,45

From studies of telephone exchange systems, specifications for solid-state switches were worked out. Such switches should replace electromagnetic relays with mechanical contacts directly. It was recognized that a sufficiently high breakdown voltage and a low on-resistance are difficult to achieve. Using discrete solid-state devices in hybrid integration with thick-film technology, solutions for crosspoint elements were worked out and tested. Since these elements were not entirely satisfactory from a cost standpoint, the breakdown voltage requirement was relaxed and weak-current crosspoint elements, which can be produced at a very low cost, were realized in MOS technology. Proposals for elements having negative resistance also indicate that solid-state switches can be constructed with negligible on-resistance. Author

N81-14230# Siemens A.G., Munich (West Germany). Werk fuer Integrierte Schaltungen.
INTEGRATED CIRCUITS FOR REMOTE COMMAND AND DATA TRANSMISSION Final Report
Eckart Schatter Bonn Bundesministerium fuer Forschung und Technologie Nov. 1979 26 p refs In GERMAN; ENGLISH summary Sponsored by Bundeministerium fuer Forschung und Technologie
(BMFT-FB-T-79-50; ISSN-0340-7608) Avail: NTIS HC A03/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 5,05

A system for command transmission was developed which leans upon a remote control for TV receivers. Extremely high noise protection and wide action range with an infrared light carrier are its outstanding features. A carrier supported modulation with biphase coding was used. A digital transmitter and a receiver IC in p-channel MOS technology and a bipolar high gain preamplifier were developed for this application. The first promising experiments with wireless data transmission were interrupted, as the expected turnover was too low. E.D.K.

N81-14231# Siemens A.G., Munich (West Germany). Unternehmensbereich Bauelemente.
BASIC CONCEPTS FOR INTEGRATED RC NETWORKS AND HYBRID CIRCUITS ON ORGANIC SUBSTRATE FOILS Final Report
Karl-Heinz Houska, Guenther Haug, Hans Schmidt, Wilfried Juergens, Eberhard Wernitz, Ulrich Wehnelt, Horst Pachonik, Joachim Rauhut, and Kurt Wohak Bonn Bundesministerium fuer Forschung und Technologie Dec. 1979 87 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-79-87; ISSN-0340-7608) Avail: NTIS HC A05/MF A01; Fachinformationszetrum, Karlsruhe, West Germany DM 18,10

For the integration of passive devices a technology was developed using plastic tapes vacuum metalized with thin-film

CrNi resistors and Al or Cu interconnections. RC networks and hybrid circuits can be produced. The thin-film resistors can be realized with high stability. Galvanically reinforced soderable Cu interconnections allow the mounting of hybrid elements as on PC cards. Capacitors with a lacquer film and glow-discharge polymerized dielectric films are likewise applied to substrate foils. FEP, which makes a practical dielectric for RF applications, was used in producing LC networks for the frequency range of TV. The potentialities offered by this technology extend to the production of new subsystems and entire modules. Author

N81-14232# AEG-Telefunken, Heilbronn (West Germany). Geschaeftsbereich Halbeiter.

DEVELOPMENT OF AN ELECTRONIC TIMEPIECE FOR TECHNICAL APPLICATIONS Final Report

Hans-Peter Wolf Bonn Bundesministerium fuer Forschung und Technologie Dec. 1979 57 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie

(BMFT-FB-T-79-88; ISSN-0340-7608) Avail: NTIS HC A04/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 11,45

The development of technology and circuit of an electronic timepiece is described. The process sequence is given and the technological process steps are described. The characterization of the technology is done by means of the electrical data. Starting with the principle of the entire circuit the function and characteristic of the individual stages and the electrical data of the main system are given. Author

N81-14233# Siemens A.G., Munich (West Germany). Research Lab.

LARGE SCALE INTEGRATED MOS-CIRCUITS WITH NARROW STRUCTURES: ARTWORKS AND MASKS. Final Report

Hartmut P. Giesler and Dusan Sofronijevic Bonn Bundesministerium fuer Forschung und Technologie Dec. 1979 58 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie

(BMFT-FB-T-79-104; ISSN-0340-7608) Avail: NTIS HC A04/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 12,20

Masks for large scale integrated (LSI) devices with more than 100,000 rectangles per artwork can be produced routinely with 1 micrometer features on large fields by light optical technology. The chiparea is limited by optics with 8 mm field to 5.2 mm x 5.2 mm. This area can be increased to at least 200 sq mm by composing with a positional and dimensional accuracy of + or - 0.4 micrometers. The medium defect densities for defect dimensions >1 micrometer are 0.3 holes/sq cm and 0.8 spots/sq cm. These values can be reduced to practically zero by the developed correction methods. In this way LSI suitable mastermasks can be produced with chromium or iron oxide layers. Author

N81-14234# Siemens A.G., Erlangen (West Germany). Zentrale Fertigungsaufgaben.

ELECTROCHROMIC DISPLAYS Final Report

Helmut Freller Bonn Bundesministerium fuer Forschung und Technologie Dec. 1979 49 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie

(BMFT-FB-T-79-108; ISSN-0340-7608) Avail: NTIS HC A03/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 10,10

The technological basis for the production of displays with electrochromic tungsten trioxide films was developed. The deposition techniques and the fashioning procedures for the necessary display film patterns, which consist of tungsten trioxide, transparent conductors and insulating films, were adapted to the specific requirements of these films. Together with a cell conception which uses ZrO2 felt as cell background, spacer, and electrolyte reservoir it was possible to build and to test electrochemical cells and prototype seven segment displays. E.D.K.

N81-14235# AEG-Telefunken, Berlin (West Germany). Energie- und Industrietechnik AG.

INVESTIGATION OF THE INTERACTION BETWEEN THE POWER ELECTRIC CIRCUIT AND POWER SUPPLY SYSTEMS Final Report

Hans-Peter Bech, Rosemarie Hermann, Detlef Knuth, and Reinhard Schwarzenau Bonn Bundesministerium fuer Forschung und Technologie Dec. 1979 337 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie

(BMFT-FB-T-79-115; ISSN-0340-7608) Avail: NTIS HC A15/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 71

Sources and consequences of the interaction between power electronics, power supply systems and telecommunications equipment were examined. Apart from this the most important variables necessary to assess the power line load, (power factor, relative harmonic content and noise current) were calculated. The energy conditions prevailing in static converters for single phase and three phase supplies were analyzed. Particular attention was given to pulsing methods for power control free of feedback effects. R.C.T.

N81-14236# Semikron Gesellschaft fuer Gleichrichterbau und Elektronik m.b.H., Nuremberg (West Germany).

NOVEL PRODUCTION METHOD FOR HIGH-VOLTAGE SEMICONDUCTOR DEVICES WITH GREATEST POSSIBLE ECONOMY Final Report

Madan Mohan Chadda, Hans-juergen Fuchs, Robert Rypacek, Werner Sichelstiel, and Werner Tursky Bonn Bundesmin. fuer Forsch. u. Technol. Dec. 1979 79 p refs In GERMAN; ENGLISH summary Sponsored by Bundesmin. fuer Forsch. U. Technol.

(BMFT-FT-T-79-126; ISSN-0340-7806) Avail: NTIS HC A05/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 16,40

The rationalization of the production method for high voltage semiconductor devices, especially for thyristors is explored. New or improved methods for diffusion, photolithography, edge contouring, surface passivation, mounting and measuring of the devices are presented. Author

N81-14237# Siemens A.G., Munich (West Germany). Werk Halbleiter.

MEDIUM POWER SILICON TRANSISTORS Final Report

Rudolf Woelfle Bonn Bundesministerium fuer Forschung und Technologie Dec. 1979 145 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung Und Technologie

(BMFT-FB-T-79-160; ISSN-0340-7608) Avail: NTIS HC A07/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 30,25

The development of various types of transistors is described as well as economical processes for fabricating silicon power transistors in triple diffusion, single diffusion, epibase technology. Problems related to materials, thermal stresses, diffusion proceses, metallization, and assembly are addressed. The best structures for diffusion and metallization are considered in relation to the electrical behavior which is demonstrated of the components. Reliability assessment is discussed and some circuits are examined. A.R.H.

N81-14238# AEG-Telefunken, Frankfurt am Main (West Germany). Research Inst.

OPTICAL TRIGGERING OF POWER THYRISTORS Final Report

Dieter Silber, Wolfgang Winter, and Marius Fuellmann Bonn Bundesministerium fuer Forschung und Technologie Dec. 1979 56 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie

(BMFT-FB-T-79-168; ISSN-0340-7608) Avail: NTIS HC A04/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 11,80

Inexpensive laboratory type light activated thyristors with base layer widths of 200 micrometers and 560 micrometers were used for the investigation of photo current yields, optical trigger levels and their correlation to the du/dt capability. GaAs:Si luminescent diodes and GaAs-GaAlAs-double-hetero-structure-lasers proved to be suitable light sources. In the case of luminescent diodes, glass fiber cables with large aperture are

advantageous. The thyristor analysis shows that further optimizations are possible, and with available optical components, the development of optically triggered power thyristors with technically reasonable properties is possible. Author

N81-14239# Siemens A.G., Munich (West Germany). Research Lab.

MONOLITHICALLY INTEGRATED CIRCUITS ON GaAs Final Report

Norbert Enders, Spyrion Gisdakis, Manfred Heinzle, Walter Kellner, Hermann Kniepkamp, Michael Pomper, and Dietrich Ristow Bonn Bundesministerium fuer Forschung und Technologie Dec. 1979 163 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie

(BMFT-FB-T-79-176; ISSN-0340-7608) Avail: NTIS HC A08/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 34,05

The development of monolithically integrated circuits on GaAs was pursued under two aspects: (1) systems with a low number of active and passive elements were constructed as microwave circuits and (2) circuits with a higher degree of integration were realized for digital and analog signal processing. For both purposes MESFETs and planar Schottky diodes were employed. Thin active layers on s.i. GaAs were realized both by vapor phase epitaxy and ion implantation. The MESFETs on both types of layers were essentially equivalent in their electrical performance. Five stage ring oscillators were analyzed yielding a delay time of 110 ps and 200 ps per gate. Schottky CCDs were built with electrode lengths of 5 micrometers and spacings of 2 micrometers. A monolithically integrated balanced mixer with Schottky diodes was built. The passive elements were realized on si.i. GaAs. The planar Schottky diodes, as the active elements, showed a cut-off freqeuncy of 300 GHz and a minimum noise figure of 9 dB at 15 GHz. E.D.K.

N81-14240# Fondazione Ugo Bordoni, Rome (Italy).

PERFORMANCE OF THE GRADIENT ADAPTIVE EQUALIZER WITH INHERENT OPTIMAL ADJUSTING STEP IN PRESENCE OF NOISE AND ARITHMETIC ERRORS

Renato Lucarelli, Gianni Orlandi (Ancona Univ., Italy), Giuseppe Martinelli (Rome Univ.), and Mario Salerno (Rome Univ.) Jul. 1979 5 p refs Presented at 1979 ISCAS

(FUB-35-1979; RIF-2C1779) Avail: NTIS HC A02/MF A01

The performance of the gradient adaptive equalizer with inherent optimal adjusting step is investigated to evaluate the effect of noise and representation errors in fixed point arithmetic. Only the final part of the convergence process is proved to be affected by these disturbances. This result, confirmed by several simulation tests, shows the possibility of implementing the equalizer by a very simple hardware based on an 8 bit fixed point arithmetic. Author

N81-14241# Atomic Weapons Research Establishment, Aldermaston (England).

A QUICK ACCURATE METHOD FOR CALCULATING TEMPERATURES ARISING FROM RECTANGULAR AND CIRCULAR MICROCIRCUIT HEAT SOURCES

D. J. Dean London Sep. 1980 35 p refs

(AWRE-O-30/80; BR76023) Avail: NTIS HC A03/MF A01

In microelectronics, the rapid degradation in reliability which occurs with modest rises in temperature makes it important that temperatures resulting from different geometries should be capable of simple evaluation. Two common geometries are those of rectangular and circular heat sources mounted upon the upper surface of a thin substrate which has a heat sink on its rear face. A series summation computation method suitable for pocket calculators, is presented by which the state of convergence, in terms of maximum possible error, is calculated at each stage in the summation, thus enabling the calculation to be terminated as soon as the required accuracy has been obtained. Author

N81-14242# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Stuttgart (West Germany). Abteilung Thermionische Energiewandlung.

WORK FUNCTION INVESTIGATIONS AT ELECTRODES WITH ADSORBED LAYERS BY MEASURING CONTACT POTENTIAL DIFFERENCES IN VAPOR ATMOSPHERE Ph.D. Thesis Tuebingen Univ., West Germany

Michael vonBradke Jan. 1980 206 p refs In GERMAN; ENGLISH summary

(DFVLR-FB-79-22) Avail: NTIS HC A10/MF A01; DFVLR, Cologne DM 33,90

One of the most promising methods for improving the efficiency of thermionic energy converters is to lower the work function of the collector electrode. Investigations in this field require suitable methods for measuring work function values within an atmosphere of adsorbing vapors at low temperatures. A survey of potential theoretical and experimental methods is given and a device and procedure described, developed for measuring contact potential differences at such conditions. Results of work function measurements are reported, concerning bare surfaces of different metallic electrodes and some cermet materials in ultra high vacuum as well as with adsorption layers of cesium, barium, oxygen or mixtures of these adsorbates. The lowest work function values could be observed with cesium adsorption on oxidized electrode surfaces, showing minimum values of about 1,0 eV. Author

N81-14243# Radio Corp. of America, Burlington, Mass. Automated Systems Div.

MANUFACTURING METHODS AND TECHNOLOGY PROGRAM AUTOMATIC IN-PROCESS MICROCIRCUIT EVALUATION Final Report, 22 Sep. 1977 - 15 Aug. 1980

R. J. Wildenberger and J. M. Laskey Oct. 1980 176 p (Contract DAAB07-77-C-0585)

(AD-A091854; DELET-TR-77-0585-F) Avail: NTIS HC A09/MF A01 CSCL 14/2

This final report summarizes all the work performed under the subject contract. The method of approach to the program included system analyses to investigate techniques for hybrid image extraction, determination of illumination requirements and techniques, and determination of Return Beam Vidicon operating modes for the demonstration model. An AIME demonstration model and system software were designed, built, integrated and tested. Technical and physical descriptions of the demonstration model equipment/software design and configuration are provided. Analysis was made of typical characteristics of hybrid thick-film substrate conductor faults resulting from printing, probing and work-in-process handling. Based on this analysis test sample substrates containing designed-in-faults were designed, fabricated and used to evaluate AIME demonstration model operation. Data resulting from AIME operation, utilizing the test sample substrates, demonstrated automatic detection of 96.4 percent of all substrate defects. When defects were classified by size, AIME successfully detected 100 percent of defects three (3) mils or larger, and 81 percent of defects less than three (3) mils. Evaluation was also made of semi-automatic mode of operation for pre-cap hybrid visual inspection. Recommendations for further system development are included. GRA

N81-14244# Naval Weapons Center, China Lake, Calif. Weapons Dept.

SYMMETRICAL COMBINER ANALYSIS WITH S PARAMETER MATRICES AND EQUIVALENT CIRCUITS

D. Kinman, M. Afendykiw, and D. White May 1980 52 p refs

(AD-A091784; AD-E900026; NWC-TP-6164) Avail: NTIS HC A04/MF A01 CSCL 09/5

A theory was developed and verified which predicts maximum potential efficiency and input impedance of symmetrical summing networks, which are used in the design of solid-state microwave power combiners. A new TM010/MIC summing network design was used to test the efficiency and input impedance equations. The resulting efficiency of this unit was 55% at Ku band, with four input ports connected. Extrapolation indicated efficiencies of 90% or better with 18 or more input ports. Sufficient room exists for 31 input ports using this technique. The theory was also extended to include degradation with one or more solid state sources failed and indicates there is potential for improvement in this area if proper design techniques are used. GRA

N81-14245# California Univ., Berkeley. Electronics Research Lab.

RESEARCH IN COMPUTER SIMULATION OF INTEGRATED CIRCUITS Final Report, 23 Feb. 1976 - 30 Jun. 1980

D. O. Pederson 30 Jun. 1980 11 p refs

(Grant DAAG29-76-G-0161)
(AD-A091609; UCB/ERL-468; ARO-13786-7-ELX) Avail: NTIS HC A02/MF A01 CSCL 09/3

This research has been concerned with investigations and development activities in the circuit simulation of integrated and discrete component electronic circuits. The results of the research activities have been reported in six publications, in the support of seven research students, and in the development and issuing of four computer programs for integrated circuit simulation. GRA

N81-14246# Naval Research Lab., Washington, D. C.
ANALYSIS OF OSCILLATIONS IN THE GYROTRON TRAVELLING WAVE AMPLIFIER
Y. Y. Lau, K. R. Chu, L. Barnett, and V. L. Granatstein 29 Oct. 1980 35 p refs
(AD-A091586; NRL-MR-4303) Avail: NTIS HC A03/MF A01 CSCL 09/5

The operation of the gyrotron travelling wave amplifier is based on the convection cyclotron maser instability. It is found that this convective instability may become absolute (nonconvective) at a sufficiently high current level, resulting in oscillation instead of amplification. This threshold current for the transition depends sensitively on the applied magnetic field. The axial wavelength and the characteristic frequency of oscillation at the onset of absolute instability are given. It is found that momentum spread has virtually no effect on the threshold current. A small amount of resistive wall loss, however, raises the threshold current significantly. Oscillations due to partial reflection at the ends of the system are also examined. Preliminary experimental results on both types of oscillations are reported and are found to be in good agreement with the theory. GRA

N81-14247# Lincoln Lab., Mass. Inst. of Tech., Lexington. Group 94.
EVALUATION OF A CCD FOR ANALOG DELAY
Gerard J. Mayer 13 Aug. 1980 39 p refs
(Contract F19628-80-C-0002; AF Proj. 3221)
(AD-A091622; ETS-54; ESD-TR-80-96) Avail: NTIS HC A03/MF A01 CSCL 09/5

A custom CCD, that has been developed for the GEODSS CCD technology program, has been evaluated as an analog delay for signal processing. The measured device parameters are listed along with an implementation. GRA

N81-14248# Northwestern Univ., Evanston, Ill. Materials Research Center.
THERMALLY STIMULATED DISCHARGE CURRENTS FROM SODIUM NITRATE DOPED POLYACRYLONITRILE Interim Technical Report
H. Ueda and S. H. Carr 3 Sep. 1980 31 p refs
(Contract N00014-75-C-0963)
(AD-A091638; TR-9) Avail: NTIS HC A03/MF A01 CSCL 11/9

Enhancement of charge capable of being stored in a polymer by direct incorporation of ions has been studied. The system chosen was polyacrylonitrile (PAN) into which had been dissolved either sodium nitrate, ammonium nitrate, or lithium chloride. Stored charge was measured by use of the Thermally Stimulated Discharge Current (TSDC) method. It was found, for example, that addition of 4 wt% salt could enhance stored charge by at least fifty-fold. The TSDC method also revealed that the stored charge arose from at least six identifiable contributions. The lower temperature contributions involved preferentially oriented dipoles, while the higher-temperature ones were caused by displaced real charges. No evidence for a strong interaction between dissolved ionic species and PAN chains at the repeat unit level was found, but density fluctuations on the supramolecular size-scale do appear to influence the stability of these stored real charges. GRA

N81-14249# Syracuse Univ., N. Y.
PERFORMANCE DEGRADATION OF A 7400 TTL NAND GATE DUE TO SINUSOIDAL INTERFERENCE Final Technical Report, Jun. 1979 - Jun. 1980
Jacob Alkalay and Donald D. Weiner Griffiss AFB, N.Y. RADC Aug. 1980 76 p refs
(Contract F30602-78-C-0083)
(AD-A091745; RADC-TR-80-257) Avail: NTIS HC A05/MF A01 CSCL 09/5

The investigation reported herein addresses the problem of electromagnetic susceptibility of digital circuits. Of particular interest is the desire to obtain electromagnetic interference (EMI) performance curves for digital circuits. This report describes an effort devoted to the electromagnetic susceptibility of a single integrated circuit 7400 TTL NAND gate. The investigation was carried out by means of a computer simulation using the computer program SPICE (Simulation Program with Integrated Circuit Emphasis). The report concentrates on the special case of sinusoidal interference inject at various circuit nodes. Under appropriate conditions the gate voltages and currents were observed to suffer severe waveform distortion. The computer simulation revealed that the sinusoidal interference could cause the propagation delays and the rise and fall times of the output waveforms to increase significantly. GRA

N81-14250# Naval Research Lab., Washington, D. C. Electron beam Applications Branch.
DESIGN OF A HIGH POWER 240 GHz GYROMONOTRON
J. D. Silverstein, M. E. Read (HDL, Adelphi, Md.), and K. R. Chu (HDL, Adelphi, Md.) 4 Nov. 1980 26 p refs
(RR0110941)
(AD-A091511; NRL-MR-4357) Avail: NTIS HC A03/MF A01 CSCL 09/5

A second harmonic gyromonotron has been designed to have an output of 4 kilowatts at a frequency of 240 GHz, and to operate with an overall efficiency of 14%. The design method utilized a detailed theory of the gyrotron oscillator and an electron orbit computer code. Particular attention was paid to the problem of mode competition in the oscillator cavity. Although a particular design example is considered, the method is of general interest. GRA

N81-14251# General Electric Co., Schenectady, N. Y. Electrical Systems and Technology Lab.
DEVELOPMENT OF A HVDC PROTOTYPE BREAKER Final Report
B. L. Damsky, P. Barkan, I. Imam, W. Permerlani, J. M. Anderson, J. J. Carroll, J. E. Hudson, R. V. Pohl, W. D. Solberg, and A. H. Sharbaugh Jun. 1980 287 p refs
(Contract DE-AC02-76ET-29054)
(DOE/ET-29054/1) Avail: NTIS HC A13/MF A01

The design features of high voltage dc circuit breaker based on the commutation concept are studied. Tests of components indicate the breaker is capable of interrupting a fault current of 10 kA on a 400 kV system and absorbing up to 10 MJ of system energy without generating more than 1.6 per unit voltage on the system. Interactions of the breaker with a three terminal network were studied using a system simulator. S.F.

N81-14252# Utah Univ., Salt Lake City. Earth Science Lab. Div.
INTERPRETATION OF DIPOLE-DIPOLE ELECTRICAL RESISTIVITY SURVEY, COLADO GEOTHERMAL AREA, PERSHING COUNTY, NEVADA
Claron E. Mackelprang Sep. 1980 94 p refs
(Contract DE-AC07-80ID-12079)
(DOE/ID-12079/11; ESL-41) Avail: NTIS HC A05/MF A01

An electrical resistivity survey in the Colado geothermal area, Pershing County, Nevada has defined areas of low resistivity on each of five lines surveyed. Some of these areas appear to be fault controlled. Thermal fluids encountered in several drill holes support the assumption that the hot fluids may be associated with areas of low resistivity. The evidence of faulting as interpreted from modeling of the observed resistivity data is therefore particularly significant since these structures may be the conduits for the thermal fluids. Sub-alluvial fault zones are interpreted to occur between stations 0-5 NW on Line D and on Line A between stations 4 NW and 4 SE. Fault zones are also interpreted on Line C near stations 1 NW, 1 SE, and 3 SE, and on Line E between stations 2-4 NW and near 1 SE. No faulting is evident under the alluvial cover on the southwest end of Line B. A deep conductive zone is noted within the mountain range on two resistivity lines. There is no definite indication that thermal fluids are associated with this resistivity feature. DOE

N81-14253# General Electric Co., Pittsfield, Mass.
STUDY OF ELECTRIC FIELD AND ION EFFECTS ON HVDC LINES Technical Progress Report, 1 Jan. - 30 Jun. 1980
Michael G. Comber and Gary B. Johnson 1980 30 p refs
(DOE/RA-50153/1; TPR-2) Avail: NTIS HC A03/MF A01

The electric field and ion current profiles were measured at ground level at midspan of a HVDC transmission line operating in a bipolar mode at various voltages and pole spacings. The electric field measurements were made using Monroe Field meters operated in an inverted geometry to allow use in foul weather. The ion current measurements were made using one meter square collection plates such that the ion current was read out directly in nanoamperes per square meter. The current and field probes were positioned at 5 meter intervals along a test strip running perpendicular to the line at midspan. The height of the line at midspan was 19.5 meters for these tests. The line was a 6 conductor bundle of 5.6 cm conductor on a 102 cm diameter bundle. Field and current measurements were made with pole spacings of 17 m and 24.5 m. The line was energized in a bipolar mode at voltages of + or - 750 kV, + or - 900 kV, + or - 1050 kV, and + or - 1200 kV. J.M.S.

N81-14254# Oak Ridge National Lab., Tenn.
PARAMETRIC STUDY OF THE STABILITY MARGINS OF CABLE-IN-CONDUIT SUPERCONDUCTORS: EXPERIMENT
J. W. Lue and J. R. Miller 1980 4 p refs Presented at the Appl. Superconductivity Conf., Santa Fe, N. Mex., 29 Sep. 1980
(Contract W-7405-eng-26)
(CONF-800980-11) Avail: NTIS HC A02/MF A01

A schematic theory is reviewed from which a scaling relation can be derived for the limiting current below which the stability margin is always single valued. Measurements at differnt magnetic fields are used to test the scaling with critical temperature and resistivity. The scaling with heated length and heat pulse duration is also examined. The results of these experiments are given and compared with theory. DOE

N81-14255# General Atomic Co., San Diego, Calif.
MEASUREMENT OF STABILITY OF CABLED CONDUCTORS COOLED BY He 1 AT REDUCED TEMPERATURE, OR He 2
Y. H. Hsu, J. R. Purcell, W. Y. Chen, and J. S. Alcorn Sep. 1980 5 p refs Presented at Appl. Superconductivity Conf., Santa Fe, N. Mex., 29 Sep. - 2 Oct. 1980
(Contract DE-AT03-76ET-51011; Gen. Atomic Proj. 3235)
(GA-A-16012; CONF-800980-13) Avail: NTIS HC A02/MF A01

Stability tests of cabled NbTi alloy conductor are described. A background field of up to 10 tesla within a 20 cm bore is provided by a nested pair of 4.2 degree K bath cooled NbTi coils. An insulated bore insert tube (coldfinger) is provided in order to perform heat pulse/recovery tests of coiled samples in cooling regimes. Tests are performed in the 2.5 to 3 degree K He 1, and saturated superfluid (He 2) regimes. The testing apparatus, procedures, and initial results are presented. DOE

N81-14256# Los Alamos Scientific Lab., N. Mex.
SUPERCONDUCTOR DESIGN AND LOSS ANALYSIS FOR A 20 MJ INDUCTION HEATING COIL
M. S. Walker (Intermagnetics General Corp.), J. G. Declercq (Intermagnetics General Corp.), B. A. Zeitlin (Intermagnetics General Corp.), J. D. Scudiere (Intermagnetics General Corp.), M. J. Ross (Intermagnetics General Corp.), M. A. Janocko (Westinghouse Electric Corp., Pittsburgh, Pa.), S. K. Singh (Westinghouse Electric Corp., Pittsburgh, Pa.), E. Ibrahim (Westinghouse Electric Corp., Pittsburgh, Pa.), P. W. Eckels (Westinghouse Electric Corp., Pittsburgh, Pa.), and John D. Rogers 1980 22 p Presented at the Appl. Superconductivity Conf., Santa Fe, N. Mex., 20 Sep. - 3 Oct., 1980
(Contract W-7405-eng-36)
(LA-UR-80-2742; CONF-800980-6) Avail: NTIS HC A02/MF A01

The design of a 50 k ampere conductor for use in a 20 MJ Induction Heating Coil is described. The conductor is a wide flat cable of 36 subcables, each of which contains six NbTi strands around a stainless steel core strand. The 2.04 mm diameter monolithic strands allow bubble clearing for cryostable operation at a pool boiling heat transfer from the unoccluded strand surface of 0.26 Watts/cu cm. A thin, tough polyester amid3-imide insulation provides a rugged coating that will resist flaking and chipping during the cabling and compaction operations and provided: (1) a reliable adherent surface for enhanced heat transfer; and (2) a low voltage standoff preventing interstrand coupling losses. The strands are uniquely configured using CuNi elements to provide low ac losses with NbTi filaments in an all copper matrix. The AC losses are expected to be approximately 0.3 percent of 20 MJ for a -7.5 to 7.5 T one second 1/2 cosinusoidal bipolar operation in a 20 MJ coil. DOE

N81-14257# Linfield Research Inst., McMinnville, Oreg.
RESEARCH ON ALKALINE ZINC SECONDARY ELECTRODES WITH EMPHASIS ON MODEL Final Report, 15 Jun. 1976 - 31 Aug. 1979
1979 52 p refs
(Contract EY-76-S-06-2434)
(DOE/RL-90369/8; RLO-2434-8) Avail: NTIS HC A04/MF A01

Experiments performed emphasized determination of the potential distribution over the surface of a flat rectangular porous zinc electrode operated under conditions of severly limited convective flow, the determination of potential distribution, and concentration variations over the surface of similar electrodes when operated under 'normal' flow conditions and the evaluation of OH depletion as a failure mode in zinc electrodes operated under conditions of severly limited convective flow. Results of the experiments and interpretations of them in terms of the appropriate models are included. Author

N81-14258# National Technical Information Service, Springfield, Va.
COMPUTER AIDED DESIGN OF MICROCIRCUITS. CITATIONS FROM THE NTIS DATA BASE Progress Report, 1964 - Mar. 1980
William E. Reed Sep. 1980 159 p Supersedes NTIS/PS-79/0870; NTIS/PS-78/0821
(PB80-814296; NTIS/PS-79/0870; NTIS/PS-78/0821) Avail: NTIS HC $30.00/MF $30.00 CSCL 09C

Government sponsored research covering the computer aided design, modeling, layout, and packaging of integrated and other microelectronic circuits are cited. Computer programs and the use of computer graphics are included. GRA

N81-14259# National Technical Information Service, Springfield, Va.
COMPUTER AIDED DESIGN OF MICROCIRCUITS. CITATIONS FROM THE ENGINEERING INDEX DATA BASE Progress Report, 1970 - Jun. 1980
William E. Reed Sep. 1980 310 p Supersedes NTIS/PS-79/0871; NTIS/PS-78/0822
(PB80-814304; NTIS/PS-79/0871; NTIS/PS-78/0822) Avail: NTIS HC $30.00/MF $30.00 CSCL 09C

Worldwide research reports covering the computer aided design, modeling, layout, and packaging of integrated and other microelectronic circuits are cited. Computer programs and the use of computer graphics are included. GRA

N81-14260# National Technical Information Service, Springfield, Va.
COMPUTER NETWORKS. CITATIONS FROM THE NTIS DATA BASE Progress Report, Aug. 1977 - Jul. 1979
Jack E. Jones Aug. 1980 249 p
(PB80-814007) Avail: NTIS HC $30.00/MF $30.00 CSCL 09C

Research reports on aspects of computer networks, including hardware, software, data transmission, time sharing, and applicable theory to network design are cited. Specific studies on the ARPA networks, and other such systems are listed. GRA

N81-14261# National Bureau of Standards, Washington, D.C. National Engineering Lab.
MEASUREMENT TECHNIQUES FOR HIGH POWER SEMICONDUCTOR MATERIALS AND DEVICES Annual Report, 1 Oct. 1978 - 30 Sep. 1979
F. F. Oettinger and R. D. Larabee Aug. 1980 63 p refs

(Contract EA-77-A-01-6010)
(PB80-217623; NBSIR-80-2061) Avail: NTIS HC A04/MF A01 CSCL 09A

The major tasks under this project are (1) to evaluate procedures for the effective utilization of deep-level measurements to detect and characterize defects which reduce lifetime or contribute to leakage current in power device grade silicon, (2) to coordinate standardization activities of preferred procedures for specimen preparation for spreading resistance measurements on thyristor-grade silicon and structures, (3) to determine technical impediments to a more effective utilization of neutron transmutation doped silicon for thyristor production, and (4) to determine the measurement and analysis needs to aid in the application of zinc oxide varistor technology for the manufacture of high voltage limiters for lightning arrester application. GRA

N81-14262# National Technical Information Service, Springfield, Va.
SUPERCONDUCTING MAGNETS. CITATIONS FROM NTIS DATA BASE Progress Report, Sep. 1978 - Sep. 1980
George W. Reimherr Oct. 1980 225 p Supersedes NTIS/PS-78/1063
(PB80-816028; NTIS/PS-79/1063) Copyright. Avail: NTIS HC $30.00/MF $30.00 CSCL 09C

The cited reports discuss research on materials studies, theory, design and applications of superconducting magnets. Examples of applications include particle accelerators, MHD power generation, superconducting generators, nuclear fusion research devices, energy storage systems, and magnetic levitation. This updated bibliography contains 218 citations, 88 of which are new entries to the previous edition. GRA

N81-14161*# General Electric Co., Utica, N. Y. Aircraft Equipment Div.
THE USE OF THE PRINCIPLE OF SUPERPOSITION IN MEASURING AND PREDICTING THE THERMAL CHARACTERISTICS OF AN ELECTRONIC EQUIPMENT OPERATED IN A SPACE ENVIRONMENT
Earl H. Gale *In* NASA. Johnson Space Center The 11th Space Simulation Conf. 1980 p 291-297 refs (For primary document see N81-14138 05-31)
Avail: NTIS HC A19/MF A01 CSCL 09C

34 FLUID MECHANICS AND HEAT TRANSFER

Includes boundary layers; hydrodynamics; fluidics; mass transfer; and ablation cooling.

For related information see also *02 Aerodynamics* and *77 Thermodynamics and Statistical Physics*.

N81-14263 Illinois Univ. at Urbana-Champaign.
STUDIES OF CONVECTIVE HEAT TRANSFER COEFFICIENT ENHANCEMENT IN TWO-PHASE, NON-BOILING FLOW Ph.D. Thesis
Yen-Chang Chu 1980 161 p
Avail: Univ. Microfilms Order No. 8026468

Heat transfer coefficient in a non-boiling, two-component, two phase flow was determined. Both upflow and downflow of air-water mixtures were studied in a 1 inch pipe. The superficial water velocities ranged from 0.40 to 3.24 m/s with the corresponding Reynolds numbers from 15,000 to 116,000. The superficial air velocities ranged from 0.39 to 1.95 m/s with the corresponding Reynolds numbers from 540 to 2,700. The two phase flow patterns observed in the experiments were bubbly, slug and froth in upflow and bubbly, slug and annular in downflow. A variety of sensors were employed in the flow loop. A conductivity probe was used to measure the void fraction profile. It was calibrated using a radiation attenuation technique. A void fraction readout device and digital counter were designed and assembled for use with this probe. The measurement of the convective heat transfer coefficient in the two-phase flow showed that the injection of air causes a significant increase in this coefficient. Dissert. Abstr.

N81-14264 National Physical Lab., Teddington (England). Div. of Chemical Standards.
BIBLIOGRAPHY OF FLUID DENSITY: EXPERIMENTAL DETERMINATIONS ON SINGLE SUBSTANCES OVER A TEMPERATURE RANGE EXCEEDING 40 K
J. L. Hales Feb. 1980 98 p
(NPL-CHEM-106; ISSN-0143-7003) Copyright. Avail: Issuing Activity

This bibliography covers over 1000 single substances, mostly organic compounds, with some non-metallic elements and inorganic compounds. The origins of the experimental data are shown, together with an indication of their status according to the amount of processing they have undergone. The temperature ranges of the liquid or vapor data are listed, often with the triple and critical point temperatures. Substances are indexed against the formula as well as the name. L.F.M.

N81-14265*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
EXPERIMENTAL STUDY OF SUPERSONIC VISCOUS LEESIDE FLOW OVER A SLENDER DELTA WING
Joachim Szodruch Dec. 1980 62 p refs
(NASA-TM-81248; A-8408) Avail: NTIS HC A04/MF A01 CSCL 20D

An investigation was conducted to study in detail the vortical flow over the leeward side of a 70 deg swept delta wing having subsonic and supersonic leading edges. Two types of flow were encountered and studied, namely leading edge separation and separation with a shock. Especially for the latter type, Reynolds number plays an important role and unexpected strong streamwise vortices were observed. An optical method is described to obtain a first aproximation of shear stress values in the streamwise direction across the wing span. Author

N81-14266*# Stevens Inst. of Tech., Hoboken, N. J. Dept. of Physics and Engineering Physics.
FREE-STREAM DISTURBANCES, CONTINUOUS EIGENFUNCTIONS, BOUNDARY-LAYER INSTABILITY AND TRANSITION Final Report, 16 May 1979 - 15 Aug. 1980
Harold Salwen Sep. 1980 92 p refs
(Grant NsG-1619)
(NASA-CR-163828) Avail: NTIS HC A05/MF A01 CSCL 20D

A rational foundation is provided for the application of the linear stability theory of parallel shear flows to transition prediction. An explicit method is given for carrying out the necessary calculations. The expansions are shown to be complete. Sample calculations show that a typical boundary layer is very sensitive to vorticity disturbance in the inner boundary layer near the critical layer. Vorticity disturbances three or four boundary layer thicknesses above the boundary are nearly uncoupled from the boundary layer, in that the amplitudes of the discrete Tollmein-Schlichting waves are an extremely small fraction of the amplitude of the disturbance. A.R.H.

N81-14267*# AiResearch Mfg. Co., Phoenix, Ariz.
NUMERICAL COMPUTATIONS OF SWIRLING RECIRCULATING FLOW Final Report
R. Srinivasan and H. C. Mongia Sep. 1980 167 p refs
(NAS3-21254)
(NASA-CR-165196; AiResearch-21-3517) Avail: NTIS HC A08/MF A01 CSCL 20D

Swirling, recirculating, nonreacting flows were computed using a 2D elliptic program consisting of three tasks. The computations in Task 1 and 2 were made using an independent analysis for the two coaxial swirling flows. The Task 2 computations were made using the measured profiles of the mixing region. In Task 3, a modified 2D elliptic program was employed to include the effects of interaction between the inner and outer streams. A.R.H.

N81-14268# Office National d'Etudes et de Recherches Aerospatiales, Leclerc (France).
REVIEW OF THEORETICAL AND EXPERIMENTAL RESULTS ON THREE-DIMENSIONAL TURBULENT WAKES AND BOUNDARY LAYERS
J. Cousteix, B. Aupoix, and G. Pailhas 1980 54 p refs In FRENCH; ENGLISH summary

(ONERA-NT-1980-4; ISSN-0078-3781) Avail: NTIS HC A04/MF A01

Various turbulence models are analyzed for boundary layer predictions: mixing length transport equations for the components of the stress. In particular the influence of shear stress direction is studied. Various solutions are discussed for taking into account the nonalignment between the shear stress and the velocity derivative normal to the wall. Such a nonalignment is also introduced in an integral method. Also, the results, of an experiment in a wake which is initially strongly asymetric and three-dimensional are discussed. They are obtained by detailed measurements of mean velocities and of the six components of the Reynolds stress tensor. Attempts of predicition are discussed. M.G.

N81-14269# Centro Informazioni Studi Esperienze, Milan (Italy). CISE Documentation Service.

A LASER DOPPLER VELOCIMETER FOR PULSATILE WATER FLOW MEASUREMENTS IN RESONANT HYDRAULIC CIRCUITS

M. Corti, M. Martinelli, and F. Parmigiani Nov. 1979 16 p refs Presented at 4th Intern. Meeting on Water Column Separation, Cagliari, Italy, 11-13 Sep. 1979

(CISE-1521) Avail: NTIS HC A02/MF A01

A Laser Doppler Velocimeter designed to measure a small oscillatory velocity component superposed to the steady water flow of a resonant hydraulic circuit in fully developed turbulence conditions is described. A frequency tracker with lock-in analysis of the velocity output is used. The rms amplitude of the oscillatory velocity component is measured with an accuracy of 1.5 mm/sec, and the mean velocity is about 3 m/sec. The resonance behavior of the velocity amplitude measured at a fixed point of the circuit is reported for the exciting frequency range 2 Hz to 5 Hz. Author

N81-14270# National Engineering Lab., East Kilbride (Scotland). Flow Measurement Div.

PRIMARY CALIBRATIONS OF CRITICAL FLOW VENTURI NOZZLES IN HIGH-PRESSURE GAS

T. J. S. Brian and J. Reid Feb. 1980 25 p refs Presented at FLOMEKO Conf., Groningen, Netherlands, Sep. 1978

(NEL-666) Avail: NTIS HC A02/MF A01

Performance evaluation tests on a set of five critical flow venturi nozzles are reported. These nozzles were tested in the new gravimetric gas flow standard test rig and a description of this unique rig is included. The experimentally determined nozzle discharge coefficients are compared with those obtained in calibrations on similar nozzles against basic reference standards, undertaken at other laboratories and they are also compared with theoretical values. Some consideration is given to the effects, on the nozzle discharge coefficient, of the temperature gradient between the nozzle wall and the main gas stream at the sonic throat. Author

N81-14271# Rolls-Royce Ltd., Derby (England).

THE PREDICTION OF THE FLOW AND HEAT TRANSFER IN THE VICINITY OF A JET IN CROSSFLOW

A. J. White 1980 26 p refs

(PNR-90025) HC A03/MF A01

The application of a three dimensional finite difference procedure to the calculation of the flow and heat transfer arising from the injection of fluid through a wall into a cross flowing mainstream is described. The computations involve the solution of the fully elliptic time averages Navier-Stokes equations describing turbulent flow, the Reynolds stresses being modelled by the k-e turbulence model. The predictions include the use of the numerical procedure to calculate the development of the flow within the injection hole iteration being carried out between this calculation and that of the external flow in order to obtain converged solutions of the flow field. Predictions are presented for injection from a single normal hole at jet to mainstream mass flux ratios between 0.24 and 2.3. Fair agreement is obtained with the heat transfer data. However, the procedure underpredicts the lateral spread of the jet at the wall, influencing the adiabatic wall effectiveness results. Although lack of grid definition results in the under predictiction of the peaks in the velocity and temperature profiles in the vicinity of the hole, good agreement is achieved with measured profiles obtained more than four diameters downstream of the hole. Author

N81-14272# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Goettingen (West Germany). Inst. fuer Theoretische Stroemungsmechanik.

STABILITY OF THREE-DIMENSIONAL SHEAR FLOWS: CRITERIA FOR INVISCID DISTURBANCE EXCITATION

Uwe Dallmann Dec. 1979 169 p refs In GERMAN; ENGLISH summary

(DFVLR-FB-80-05) Avail: NTIS HC A08/MF A01; DFVLR, Cologne DM 26,50

For several three dimensional, incompressible steady shear flows initial boundary value problems for the evolution of disturbances are derived in the frame of linear stability theory. For flows in the vicinity of rotating disks, they cover different modes of disturbances amplification without any simplification. It is shown that self excited disturbances in axial stagnation flow have no similarity with Taylor Goertler vortices. For instabilities in stagnation flow on a swept back cylinder advection and vortex stretching of disturbances is considered. Transition modes between Tollmien Schlichting waves and Taylor Goertler vortices are discussed. Inviscid disturbance amplification within helical boundary layers and internal flows is studied in detail. The generalization of known theories delivers a generalized point of inflection criterion for which streamline curvature is taken into account. Author

N81-14273# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Goettingen (West Germany). Abt. Turbulenzforschung.

AN INVESTIGATION OF TURBULENT WALL-PRESSURE FLUCTUATIONS IN A PIPE DOWNSTREAM OF AN ABRUPT ENLARGEMENT OF ITS CROSS-SECTIONAL AREA

Bernhard Stahl Feb. 1980 34 p refs In GERMAN; ENGLISH summary

(DFVLR-FB-80-11) Avail: NTIS HC A03/MF A01; DFVLR, Cologne DM 6,30

Turbulent flow in a pipe having a circular profile with an abrupt enlargement of its cross sectional area generates aerodynamic noise. It is suspected that turbulent pressure fluctuations in the large scale structures downstream of the abrupt jump in cross sectional areas are particularly effective noise generators. These large scale structures in the turbulence are determined via microphone measurements of wall pressure fluctuations in the enlarged section of the pipe. The special axially symmetric boundary conditions of the circular pipe make possible the expansion of circumferential cross spectra into azimuthal components of the turbulent fluctuations. Author

N81-14274# Pennsylvania State Univ., University Park. Applied Research Lab.

AN AXISYMMETRIC, STRONG-INTERACTION PROCEDURE TO INCLUDE LARGE NORMAL PRESSURE GRADIENTS

M. S. Dietz 24 Jul. 1980 37 p refs

(Contract N00024-79-C-6043)
(AD-A091820; ARL/PSU/TM-80-160) Avail: NTIS HC A03/MF A01 CSCL 20/4

This report presents a modified strong-interaction procedure for axisymmetric bodies. The modifications include the addition of the normal momentum equation to the boundary-layer calculations and the patching of the viscous-inviscid flow solutions at the boundary-layer edge to account for large, normal pressure gradients. The resulting weakly elliptic problem is solved by an iterative technique. Based on results to date, the use of an under-relaxation factor and some smoothing are required to obtain a converged solution. GRA

N81-14275# ARO, Inc., Arnold Air Force Station, Tenn.

LASER-RAMAN/RAYLEIGH FLOW DIAGNOSTIC TECHNIQUES APPLIED TO SUBSONIC FLOW Final Report, 13 Apr. 1977 - 14 Mar. 1978

W. D. Williams, D. W. Sinclair, and L. L. Price AEDC Oct. 1980 57 p refs Sponsored by Air Force

(AD-A091695; AEDC-TR-80-20) Avail: NTIS HC A04/MF A01 CSCL 20/4

The feasibility of performing laser-Raman/Rayleigh scattering measurements in subsonic flows was demonstrated in the 6 in.

Acoustic Research Tunnel (ART) of the Propulsion Wind Tunnel facility at AEDC. The ART is an open-circuit, atmospheric inbleed tunnel that operates on the Plenum Evacuation System of the 16 ft transonic Propulsion Wind Tunnel (16T). Laser-Raman/Rayleigh scattering techniques were used to measure air number density, H2O number density, and static temperature and to detect the onset of water vapor condensation. Measurements were made near the tunnel axial centerline over the Mach number range from 0.10 to 0.80. Measurements were also made in the turbulent boundary layer on the wall of the test section at Mach numbers 0.50 to 0.80. GRA

N81-14276# Air Force Wright Aeronautical Labs., Wright-Patterson AFB, Ohio.

EFFECTS OF DOWNSTREAM DISTANCE ON TURBULENCE DECAY FOR THE COMPRESSOR RESEARCH FACILITY LOW CONDITIONING SYSTEM Final Report, 1 Feb. 1978 - 1 Jul. 1979

Douglas C. Rabe Mar. 1980 72 p refs
(AF Proj. 3066)
(AD-A091543; AFWAL-TR-80-2023) Avail: NTIS HC A04/MF A01 CSCL 14/2

The turbulence decay of the 304.8 cm (120 in) diameter flow conditioning system for the Air Force Aero Propulsion Laboratory's Compressor Research Facility was investigated in a 25.4 cm (10 in) diameter channel to predict turbulence levels that can be expected at the entrance to compressors being tested in the facility. Results of this experimentation show that the flow conditioning system will meet the design goal of reducing the expected imcoming turbulence level of 30-40% to less than 1% at the entrance to a test compressor. Further, the turbulence decay associated with the full-flow conditioning system and its individual components possesses initial period of decay characteristics throughout the 600 cm decay length investigated. It is concluded that these decay characteristics are due to the large scale of turbulence incoming and exiting the flow conditioning system of the Compressor Research Facility. GRA

N81-14277# Sandia Labs., Albuquerque, N. Mex. Fluid Mechanics and Heat Transfer Div.

ANALYTIC SOLUTIONS FOR THERMAL CONDUCTION FROM HEAT PRODUCING CYLINDERS AND SPHERES

David K. Gartling May 1980 39 p refs
(Contract DE-AC04-76DP-00789)
(SAND-80-0039) Avail: NTIS HC A03/MF A01

Solution methods are developed to determine the temperature fields surrounding time dependent, cylindrical or spherical heat sources located in an infinite or semi-infinite medium. The method of superposition is employed to extend the single source solutions to the case of multiple heat sources. Numerical procedures are developed to efficiently evaluate the integral heat source solutions. Two computer programs based on the solution procedure are described. Complete user instructions and example problems for these programs are presented. DOE

N81-14278# Brown Univ., Providence, R. I.

TWO PHASE FLOW STUDIES Final Report, 1 Jun. 1979 - 31 Aug. 1980

J. Kestin and P. F. Maeder Aug. 1980 15 p
(Contract DE-AC02-79ET-27255)
(DOE/ET-27225/13) Avail: NTIS HC A02/MF A01

Schematics and equipment specifications are given for a facility designed for the flow testing of substances in two phase flow in pipes up to 2 inches in diameter. Flow conditions to be achieved are from pure liquid to fully choked two phase flow with and without the addition or rejection of heat in the test section. Data was collected for n inclusion in a geofluid transmission system manual and an improved formulation of the equilibrium properties of isobutane was developed. The state of the art in geothermal energy conversion was monitored. Work continued in the area of hybrid combustion geothermal power cycles. A.R.H.

N81-14279# Los Alamos Scientific Lab., N. Mex.

CERAMIC HEAT PIPE DEVELOPMENT Quarterly Report, 1 Apr. - 31 Jun. 1980

M. Merrigan Sep. 1980 10 p refs Sponsored by DOE
(DOE/TIC-11293) Avail: NTIS HC A02/MF A01

Ceramic materials used in conventional brickwork heat exchanger configurations increase allowable temperatures; however, joint leakage problems limit use of these designs. Ceramic tube heat exchanger designs reduce these problems but still require sliding joints and compliant tube end seals. Ceramic heat pipe based recuperator designs eliminate the sealing problems that limited the high temperature heat recovery installations. Heat pipe recuperators offer high corrosion and abrasion resistance, high temperature capability, reduced leakage, element redundancy, and simplified replacement and cleaning. The development of ceramic heat pipe recuperator elements involves the selection and test of materials and fabrication techniques having production potential, evaluation of technology in subscale tests, design and test of components for full scale recuperator applications, and demonstration of heat pipes in subscale and full scale recuperator installation. S.F.

N81-14280# Edgerton, Germeshausen and Grier, Inc., Idaho Falls, Idaho.

TABLES OF HOMOGENEOUS EQUILIBRIUM CRITICAL FLOW PARAMETERS FOR WATER IN SI UNITS

Douglas G. Hall and Linda S. Czapary Sep. 1980 288 p refs
(Contract DE-AC07-76ID-01570)
(EGG-2056) Avail: NTIS HC A13/MF A01

Tables and charts are presented which contain data calculated using the homogeneous equilibrium critical flow model. The ranges of stagnation state properties for which data are presented include: pressures from 2 to 22 120 kPa, temperatures from 290 to 640 K, and thermodynamic qualities from 0 to 1. DOE

N81-14281# Los Alamos Scientific Lab., N. Mex.

SOLA-VOF: A SOLUTION ALGORITHM FOR TRANSIENT FLUID FLOW WITH MULTIPLE FREE BOUNDARIES

B. D. Nichols, C. W. Hirt, and R. S. Hotchkiss Aug. 1980 123 p refs
(Contract W-7405-eng-36)
(LA-8355) Avail: NTIS HC A06/MF A01

A computer program is presented for the solution of two dimensional transient fluid flow with free boundaries. The SOLA-VOF program, which is based on the concept of a fractional volume of fluid is more flexible and efficient than other methods for treating arbitrary free boundaries. Its basic model of operation is for single fluid calculations having multiple free surfaces. However, SOLA-VOF can also be used for calculations involving two fluids separated by a sharp interface. In either case, the fluids may be treated as incompressible or as having limited compressibility. Surface tension forces with wall adhesion are permitted in both cases. DOE

N81-14282# Oak Ridge National Lab., Tenn.

ICE-MAKER HEAT PUMP DEVELOPMENT Final Report

Van D. Baxter Sep. 1980 71 p refs
(Contract W-7405-eng-26)
(ORNL/CON-50) Avail: NTIS HC A04/MF A01

Four test unit ice maker heat pumps (IMHPs) were tested under the annual cycle energy system (ACES) program. Performance results on the effects of harvesting scheme, plate loading, and cycling operation were compared. The ice packing density of IMHPs was also studied and compared with that of ice manufactured by commercial ice makers and brine chiller ACES. Three harvesting schemes were tested: hot gas, stored refrigerant, and dual fluid, off cycle. The hot gas scheme tended to penalize excessively the heating output of the system. Stored refrigerant schemes eliminated that problem but caused compressor failures due to flood-back and oil dilution. The dual fluid schemes exhibited no such problems and demonstrated an ability to harvest during compressor off cycles. Therefore, it was concluded that dual fluid, off cycle schemes are the best for use with IMPHs. Plate loading tests in which compressor speed and evaporator size are varied clearly showed that evaporator plate loading should be as low as possible. DOE

N81-14283# General Electric Co., Philadelphia, Pa. Space Div.

DEVELOPMENT AND DEMONSTRATION OF A STIRLING/RANKINE HEAT ACTIVATED HEAT PUMP Semiannual Report, Jul. - Dec. 1979

1979 131 p

(Contract EC-77-C-02-2911)
(DOE/CS-20043/T1; GE80SDS-4230; COO-2911-6) Avail: NTIS HC A07/MF A01

Program effort during the eighth 6 month period of phase 2 was concentrated on subsystem fabrication, testing of the combustor, compressor and controls, preparation for integrated engine compressor testing of the Proto 2 unit, and updating of system performance and cost analyses. In addition, follow up test facility upgrading work was completed and the field evaluation test site screening, selection and preliminary modification were carried out. A table summarizes the major system development accomplishments during the reporting period. Program progress on each subsystem, overall product design and all other related program ares are described. A.R.H.

N81-14284# Virginia Polytechnic Inst., Blacksburg.
THE EFFECTS OF SHEAR AND ROUGHNESS ON VORTEX SHEDDING PATTERNS BEHIND A CIRCULAR CYLINDER AT CRITICAL REYNOLDS NUMBERS
David M. Rooney and Rodney D. Peltzer Oct. 1979 114 p refs Sponsored by NOAA
(DOE/NOAA/OTEC-1; VPI-AERO-101) Avail: NTIS HC A06/MF A01

Wind tunnel tests were conducted in an effort to understand the vortex shedding patterns to be experienced by the OTEC cold water pipe. Test procedures are described for obtaining the velocity and distribution profiles, the surface pressure measurements, and the eddy characteristics. Results discussed include the surface pressure distribution for both uniform and sheared flow cases, the vortex shedding pattern for smooth and rough cylinders in sheared and uniform flow, and the effect of shear on cell length. A rather wide range of values of supercritical Strouhal numbers was observed. Newly documented phenomena associated with shear flow vortex shedding are: (1) any linear shear, however slight, in the upstream velocity profile, triggers a cellular vortex shedding pattern; (2) at a given supercritical Reynolds number, the range in shedding frequencies is greater on a smooth cylinder than on a rough cylinder; (3) the average cell length for a rough cylinder is greater than for a smooth cylinder in tests for which endplates effects are not predominant; (4) a general trend toward decreasing cell length with increasing shear. DOE

N81-14285# National Technical Information Service, Springfield, Va.
NUMERICAL METHODS IN FLUID FLOW PROBLEMS. CITATIONS FROM THE NTIS DATA BASE Progress Report, Aug. 1978 - Jul. 1979
Guy E. Habercom, Jr. Sep. 1980 165 p
(PB80-814171) Avail: NTIS HC $30.00/MF $30.00 CSCL 20D

Among the numerical techniques cited in the report for analysis of fluid flow problems include finite difference theory, finite element analysis, and numerical integration of differential equations including the Navier Stokes equations. Areas studied include boundary layer, hypersonic, supersonic, transonic regimes, atmosphere entry, heat transfer, blunt and concave bodies, gas dynamics, nozzle gas flow, turbomachinery, and hydrodynamics. This updated bibliography contains 158 citations, none of which are new entries to the previous edition. GRA

N81-14286# National Technical Information Service, Springfield, Va.
NUMERICAL METHODS IN FLUID FLOW PROBLEMS. CITATIONS FROM THE NTIS DATA BASE Progress Report, Aug. 1979 - Jun. 1980
Guy E. Habercom, Jr. Sep. 1980 171 p Supersedes NTIS/PS-79/0852; NTIS/PS-78/0824
(PB80-814189; NTIS/PS-79/0852; NTIS/PS-78/0824) Avail: NTIS HC $30.00/MF $30.00 CSCL 20D

Numerical techniques for analysis of fluid flow problems include finite difference theory, finite element analysis, and numerical integration of differential equations including the Navier Stokes equations discussed in approximately 164 citations. Areas studied include boundary layer, hypersonic, supersonic, transonic regimes, atmosphere entry, heat transfer, blunt and concave bodies, gas dynamics, nozzle gas flow, turbomachinery, and hydrodynamics. GRA

N81-14163*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex. Space Simulation Lab.
THERMAL VACUUM PERFORMANCE TESTING OF THE SPACE SHUTTLE ORBITER RADIATOR SYSTEM
Albert F. Behrend, Jr., Gorden D. Chandler (Rockwell International Corp., Houston, Tex.), and Harold R. Howell (Vought Corp., Dallas) *In its* The 11th Space simulation Conf. 1980 p 305-317 refs (For primary document see N81-14138 05-31)
Avail: NTIS HC A19/MF A01 CSCL 20D

N81-14165*# Aerojet Liquid Rocket Co., Sacramento, Calif.
THERMAL PROTECTION OF REENTRY VEHICLES BY ACTIVELY COOLED NOSETIPS
R. E. Walker and J. W. Hidahl *In* NASA. Johnson Space Center The 11th Space Simulation Conf. 1980 p 331-346 refs Prepared in cooperation with Aerojet Services Co., Sacramento, Calif. (For primary document see N81-14138 05-31)
Avail: NTIS HC A19/MF A01 CSCL 20D

35 INSTRUMENTATION AND PHOTOGRAPHY

Includes remote sensors; measuring instruments and gages; detectors; cameras and photographic supplies; and holography.

For aerial photography see *43 Earth Resources*. For related information see also *06 Aircraft Instrumentation*, and *19 Spacecraft Instrumentation*.

N81-14287* National Aeronautics and Space Administration. Pasadena Office, Calif.
LOW COST CRYOSTAT Patent
James B. Stephens, inventor (to NASA) (JPL) Issued 26 Aug. 1980 9 p Filed 29 Mar. 1979 Supersedes N79-20283 (17-11, p 1417) Sponsored by NASA
(NASA-Case-NPO-14513-1; US-Patent-4,218,892; US-Patent-Appl-SN-025162; US-Patent-Class-62-514R; US-Patent-Class-165-105) Avail: US Patent and Trademark Office CSCL 14B

A cryostat for use in a low or a substantially gravity-free environment adapted to cool an experiment through the use of helium 2, or helium in its super fluid state is characterized by a number of interchangeable daughter dewars and helium supply or mother dewar. A low pressure venting system is provided for converting helium contained in the mother dewar to a superfluid state for use as a primary cryogen. Each daughter dewar is adapted to be removably mounted in mated relation on the mother dewar and is characterized by support for an experiment package, a source of helium to be employed as a secondary cryogen. A heat pipe is suspended from each daughter dewar and adapted to be extended into the mother dewar for facilitating cooling of the secondary cryogen. A transfer of heat from the package to the primary cryogen, via the secondary cryogen, is accommodated as a film flow of helium 2 progresses from the heat pipe to the experiment dewar.

Official Gazette of the U.S. Patent and Trademark Office

N81-14288*# Texas Univ. at Austin. Applied Research Lab.
DIGITAL DATA RECORDING SYSTEM (DDRS) OPERATING AND MAINTENANCE MANUAL Final Technical Manual, 15 Dec. 1976 - 30 Jun. 1980
Carroll R. Griffin and Jack I. Jones 29 Aug. 1980 281 p refs
(Contract NAS9-15217)
(NASA-CR-160894; ARL-TM-80-14) Avail: NTIS HC A13/MF A01 CSCL 14E

The digital data recording system (DDRS) was designed, fabricated, tested, and delivered. This unit is the interface between the synthetic aperture radar (SAR) and the recording system. The SAR data are formatted in the DDRS for data processing on the ground. Author

N81-14289# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Goettingen (West Germany). Inst. fuer

Experimentelle Stroemungsmechanik.

A COMPUTER-BASED LASER DOPPLER VELOCIMETER

Jens-Carsten Petersen Jun. 1979 64 p refs In GERMAN; ENGLISH summary

(DFVLR-Mitt-79-14) Avail: NTIS HC A04/MF A01; DFVLR, Cologne DM 11,50

A Laser-Doppler-Velocimeter is described which is specially designed for windtunnel applications. Facing other Velocimeters the data analysis is here performed digitally by use of a computer. The control of the testing procedure is also done by the computer, while a remote control is installed between computer and positioning control for the optical part of the Velocimeter, built up on two three-axis-travers mechanisms. This remote control generates or improves all signals necessary for control procedures. In addition to the description of the system's functions, necessary and desirable improvements are briefly discussed. Author

N81-14290# Instituut voor Kernphysisch Onderzoek, Amsterdam (Netherlands).

OPERATION OF MULTIWIRE DRIFT CHAMBERS (MWDCS) IN THE QDD AND QDQ FOCAL PLANES

J. H. J. Distelbrink 1980 35 p refs

(INTERIKO-80/1; ISBN-90-6488-003-4) Avail: NTIS HC A03/MF A01

In the multiwire driftchamber with coding system the speed of multiwire proportional chamber and the (place) accuracy of a driftchamber are combined. This is realized using a MWPC geometry with a low aspect ratio (small wire cathode distance). The electronics is based on a (fast) MWPC readout system to which a relatively small amount of electronics is added to supply driftime information. The typical problems of this type of wire chamber are: (1) the curved electric field lines near the wires; (2) the positive induced pulses, which are always present in MWPC-like wirechambers; (3) the relatively high cost per wire. S.F.

N81-14291# Central Electricity Generating Board, Southampton (England). Marchwood Engineering Lab.

A CAMERA DEVICE FOR THE MEASUREMENT OF PIN BOWING IN AGR FUEL ELEMENTS

J. M. Webster and C. R. Davis London Jun. 1980 4 p

(TDB-350) Avail: NTIS HC A02/MF A01

Measurement of pin bow is part of normal procedure of optical examination of those Advanced Gas Cooled Reactor (AGR) fuel elements selected for post irradiation examination. A camera device is described which is suitable for making measurements of pin bow swiftly and accurately, and if necessary providing a permanent photographic record. The device employs an objective lens of physically large diameter relative to the pin size. With the longitudinal axis of the AGR element pin bundle aligned to the axis of the lens, a real shadowgraph image can be obtained of any point along the length of a pin or array of pins. This image is referred to a known pattern in order to measure bowing. Author

N81-14292# Institut Franco-Allemand de Recherches, St. Louis (France).

THE DALEMBERTOMETER

P. Smigielski and P. G. Sava 20 Nov. 1979 9 p refs Presented at 2nd European Congr. on Opt. Appl. to Metrology (OPIEM 79), Strasburg, Nov. 1979

(ISL-CO-220/79) Avail: NTIS HC A02/MF A01

A new device is presented utilizing a He-Ne 5 mW laser as a light source, and including a Mach-Zehnder interferometer coupled with schlieren systems with defocalized phase plates permitting the measurement of the dalembertian of the optical path along a trajectory of the laser beam in a transparent medium. This device which required a long development, as much optically as electronically, is used for the study of noise sources in the air jets. The particularities of the system are described and its performances are illustrated by applications in aerodynamics. Author

N81-14293# Naval Research Lab., Washington, D. C.

MAGNETO-OPTIC MATERIALS FOR BIASING RING LASER GYROS. COMPUTER MODEL EVALUATING SCATTERING FROM MULTILAYER DIELECTRIC THIN FILM STRUCTURES CONTAINING A MAGNETIC LAYER Interim Report

J. J. Krebs and W. G. Maisch 30 Sep. 1980 75 p refs

(AD-A091540; NRL-MR-4364; Rept-3) Avail: NTIS HC A04/MF A01 CSCL 20/3

A computer model for evaluating the optical and magneto-optical scattering from a multilayer magnetic-dielectric thin film structure is described. The model handles the Faraday effect in the magnetic layer as well as all three magnetic Kerr effects (transverse, polar, and longitudinal) at its interfaces. This model should serve as a useful design tool for magnetic bias ring laser gyro mirrors and typical results are shown for this application. GRA

N81-14294# Sandia Labs., Albuquerque, N. Mex. Systems Research Div.

FILM TRANSPORTING CURVED CRYSTAL X-RAY SPECTROMETER

Lenor W. Morrison Sep. 1980 14 p refs Sponsored by DOE

(SAND-80-1286) Avail: NTIS HC A02/MF A01

A spectrometer to measure the energy of incident X-rays was designed and developed. Unlike current spectrometers that can record only one exposure, the new device can record up to 25 exposures of individual X-ray spectra without need to remove the film. It is compact (less than 15 cm across) yet holds more than 7 m of X-ray sensitive film. Although designed for a special purpose, it can be used for any system that produces X-rays. Author

N81-14295# Tulsa Univ., Okla.

EVALUATION OF ORIFICE METER RECORDER MEASUREMENT ERRORS IN LOWER AND UPPER CAPACITY RANGES Final Report

Z. Schmidt, J. P. Brill, H. D. Beggs, W. A. Coberly, and J. Fujita Sep. 1980 79 p refs

(Contract DE-AC19-79BC-10025)

(DOE/BC-10025/18) Avail: NTIS HC A05/MF A01

An experimental investigation of the magnitude of errors in gas flow rate measurements that occurs from operating orifice meters in the upper and lower limits of their ranges is discussed. A total of 303 sets of data was obtained. The data included both the differential pressure and static pressure measurements of four different orifice recorders, plus the flowing temperature and the static pressure of a sonic nozzle. The volumetric flow rates calculated from the data recorded in the upper and lower ranges were compared to flow rates calculated from data in the middle range. The results show that accurate gas flow rate measurements can be obtained by restricting the operating range of the meter to between 20 and 100 percent of the maximum. M.G.

N81-14296# Oak Ridge National Lab., Tenn. Instrumentation and Controls Div.

AN OPTICAL WATTHOUR METER DIGITIZER

W. H. Andrews Oct. 1980 18 p refs

(Contract W-7405-eng-26)

(ORNL/TM-7355) Avail: NTIS HC A02/MF A01

An optical watthour meter digitizer was developed which meets these criteria. Based on the induction-type watthour meter, the digitizer provides an output pulse for a fixed amount of energy use. The digitizer senses the motion of the rotor disc of the meter by optically detecting passage of a nonreflective area painted on the underside of the disc. The passage of such area initiates a logic compatible output pulse that can be used to measure power or energy usage in a variety of ways. The accuracy of the measurement is determined by the watthour meter. The resolution of the measurement is determined by the K/sub h/constant (in watthours per revolution) of the meter and the number of equally spaced targets painted on the disc. The resolution of this device can be as small as a fraction of a watthour; the resolution of the manually read register on a watthour meter is typically a fraction of a kilowatthour. Several digitizers were fabricated, bench tested, and installed in the field for long-term performance testing. All are performing satisfactorily. DOE

N81-14297# National Technical Information Service, Springfield, Va.

HOT FILM ANEMOMETRY. CITATIONS FROM THE NTIS

DATA BASE Progress Report, 1964 - Jun. 1980
Guy E. Habercom, Jr. Aug. 1980 63 p Supersedes NTIS/PS-79/0909; NTIS/PS-78/0879
(PB80-814288; NTIS/PS-79/0909; NTIS/PS-78/0879) Copyright. Avail: NTIS HC $30.00/MF $30.00 CSCL 14B

The principles of hot film anemometer operation are summarized; wind tunnel and laboratory tests are described; flow field dynamics are discussed involving turbulence, boundary layers, separation, shock waves, and stresses; mathematical models and analysis are presented; computer techniques are outlined; and a number of applications are given. This updated bibliography contains 58 citations, 3 of which are new entries to the previous edition. GRA

N81-14162*# Martin Marietta Corp., Denver, Colo. Space Simulation Lab.
P78-2 (SCATHA) SATELLITE THERMAL BALANCE TEST, A LABORATORY TEST
Robert P. Parrish, Jr. *In* NASA. Johnson Space Center The 11th Space Simulation Conf. 1980 p 298-304 (For primary document see N81-14138 05-31)
Avail: NTIS HC A19/MF A01 CSCL 14B

N81-14949*# York Univ., Toronto (Ontario).
WIDE ANGLE MICHELSON DOPPLER IMAGING INTERFEROMETER
G. G. Shepherd *In* NASA. Marshall Flight Center Space Plasma Phys. Active Expt. Oct. 1980 p 75-90 refs (For primary document see N81-14944 05-99)
Avail: NTIS HC A11/MF A01 CSCL 14B

N81-14950*# Herzberg Inst. of Astronomy, Ottawa (Ontario).
SPACELAB ENERGETIC ION MASS SPECTROMETER
B. A. Whalen, I. B. McDiarmid, J. R. Burrows, R. D. Sharp (Lockheed Palo Alto Research Lab., Calif.), R. G. Johnson (Lockheed Palo Alto Research Lab., Calif.), and E. G. Shelley (Lockheed Palo Alto Research Lab., Calif.) *In* NASA. Marshall Space Flight Center Space Plasma Phys. Active Expt. Oct. 1980 p 91-106 refs (For primary document see N81-14944 05-99)
Avail: NTIS HC A11/MF A01 CSCL 14B

N81-14954*# Communications Research Centre, Ottawa (Ontario).
THE WISP/HF SYSTEM FOR SPACELAB
H. G. James *In* NASA. Marshall Flight Center Space Plasma Phys. Active Expt. Oct. 1980 p 173-184 refs (For primary document see N81-14944 05-99)
Avail: NTIS HC A11/MF A01 CSCL 14B

N81-14955*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
MAGNETOSPHERIC MULTIPROBES: INVESTIGATIONS AND INSTRUMENTATION
J. L. Burch (Southwestern Research Inst.), C. R. Chappell, S. A. Fields, C.-G. Falthammar (Swedish Royal Inst. of Technology), J. D. Winningham (Southwestern Research Inst.), W. B. Hanson (Texas Univ., Dallas), R. A. Heelis (Texas Univ., Dallas), W. J. Heikkila (Texas Univ., Dallas), M. Sugira (NASA. Goddard Space Flight Center), and W. H. Farthing (NASA. Goddard Space Flight Center) *In* NASA. Marshall Space Flight Center Space Plasma Phys. Active Expt. Oct. 1980 p 185-214 refs (For primary document see N81-14944 05-99)
Avail: NTIS HC A11/MF A01 CSCL 14B

36 LASERS AND MASERS

Includes parametric amplifiers.

N81-14298# Stuttgart Univ. (West Germany).
DESIGN STUDY FOR THE JET DIAGNOSTIC SYSTEMS QUASI-CONTINUOUS LASER SCATTERING
K. Hirsch, H. Salzmann, H. Roehr (Max-Planck-Inst. fuer Plasmaphysik, Garching, West Germany), and K. H. Steuer (Max-Planck-Inst. fuer Plasmaphysik, Garching, West Germany) Jan. 1980 72 p refs
(Contract B-GI-402)
(IPF-80-2; IPP-III/55) Avail: NTIS HC A04/MF A01

The design study for a quasicontinuous Thomson scattering system for JET capable of measuring the electron temperature throughout the discharge time is reported. The arrangement is based on an 8 deg forward scattering geometry. Different possible laser systems are compared. The chosen laser is a 100 Hz repetition rate Q switched neodymium laser emitting at least 1 J unpolarized per pulse. Silicon avalanche photodiodes are used as detectors. The merits of these detection for scattering experiments are discussed and signal to noise considerations are given. Author

N81-14299# Stuttgart Univ. (West Germany). Inst. fuer Plasmaforschung.
TIME RESOLVED THOMSON SCATTERING USING A PERIODICALLY EMITTING RUBY LASER
R. Behn Feb. 1980 92 p refs In GERMAN; ENGLISH summary
(IPF-80-4) Avail: NTIS HC A05/MF A01

A ruby laser is presented which emits a sequence of regular spikes of megawatt peak power during each flashlamp discharge. Periodic Q-switching by means of a Pockels cell and a high voltage pulse generator was found to produce the desired laser emission. The laser was designed for application in plasma diagnostics to measure submillisecond temporal changes in electron density and temperature via Thomson scattering. The improvement in the signal-to-noise ratio obtained by the use of periodically emitted short pulses is discussed. A 'boxcar' integrator was used for signal processing, allowing a choice between an optimum signal-to-noise ratio or time resolution of the measurement. A scattering experiment on a high density arc plasma was carried out successfully, demonstrating the capabilities of this new method. From these results the feasibility of a scattering measurement on a Tokamak machine, using this kind of laser, is inferred. Author

N81-14300# Institut Franco-Allemand de Recherches, St. Louis (France).
CONTROLS OF AERONAUTICAL STRUCTURES UNDER FATIGUE TESTING BY HOLOGRAPHIC PULSED LASERS INTERFEROMETRY
H. Fagot, F. Albe, P. Smigielski, A. Stimpfling, and J. L. Arnaud (SNIAS) 20 Nov. 1979 11 p refs Presented at 2nd European Congr. on Opt. Appl. to Metrology (OPIEM 79), Strasburg, Nov. 1979 Sponsored in part by Direction des Recherches, Etudes et Techniques
(ISL-CO-218/79) Avail: NTIS HC A02/MF A01

A compact and mobile holographic camera is described which is capable of recording holograms by double exposure. The time lapse between the 2 laser impulses (duration 20 ns, energy 100 mJ approx.) is adjustable from 0.1 micron to infinity. The successful 'in situ' experimentation of this device took place while bars of aeronautical structures were being tested for fatigue (periodical tensile stress). The holograms were recorded without interrupting the fatigue testings which lasted several hours. The testbars being used were chosen because their characteristics demonstrate problems typically met in aeronautics. A.R.H.

N81-14301# Centro Informazioni Studi Esperienze, Milan (Italy).
ASYMPTOTIC ANALYSIS OF A CO-FOCAL UNSTABLET RESONATOR WITHOUT ACTIVE MEDIA [ANALISI ASINTOTICA DI UN RISONATORE INSTABILE CONFOCALE SENZA MEZZO ATTIVO]
L. Garifo, L. Grisoni (RTM, Vico CNAVESE), A. M. Malvezzi, and A. Morelli (RTM, Vico CNAVESE) Jan. 1980 41 p refs In ITALIAN; ENGLISH summary
(Contracts CNR/CISE-78-01902.98; CNR/RTM-78-01897.98) (CISE-1526) Avail: NTIS HC A03/MF A01

Two computer codes are described for calculating the modes of an empty unstable confocal laser cavity with spherical mirrors of circular cross section. The calculations are based on the asymptotic theory and take into account the diffraction effects. The field distributing in the far field is computed as Fourier transform of the cavity output field. The limitations of the computer codes are analyzed and some results are presented for a case of particular interest. Author

N81-14302# Spectron Development Labs., Inc., Costa Mesa, Calif.

EXPERIMENTAL AND ANALYTICAL DEVELOPMENT OF THE APPLICATION OF A TRANSIT LASER VELOCIMETER Final Report, Mar. - Sep. 1979

A. E. Smart and W. T. Mayo, Jr. AEDC Nov. 1980 187 p refs

(Contract F40600-79-C-0003)

(AD-A091762; SDL-79-6501; AEDC-TR-80-28) Avail: NTIS HC A09/MF A01 CSCL 14/2

Spectron Development Laboratories, Inc. has designed, constructed and demonstrated a rugged, compact, and reliable coaxial backscatter laser transit anemometer system. Measurements have been made through a 1.25 inch thick window without seeding at a range of 400 mm from very clean air at 1200 m/s with 80 mW of laser power incident on the sampling volume and a 100 mm diameter collection lens. The system employs many refined and/or new techniques which include specially prepared single fiber optic light guides, spatial filtering of flare light from the opposite spot, high gain photomultiplier tubes with preamplifiers, filter/discriminators which reject single photon events and estimate pulse center time, microcomputer control of optics and electronics, with on-line flow parameter estimation and graphics display. GRA

N81-14303*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

ENERGY TRANSFER AND QUENCHING RATES OF LASER-PUMPED ELECTRONICALLY EXCITED ALKALIS IN FLAMES

John E. Allen, Jr., William R. Anderson, David R. Crosley (SRI International, Menlo Park, Calif.), and Todd D. Fansler (General Motors Research Labs., Warren, Mich.) Aug. 1980 39 p refs

(DA Proj. 1L1-61102-AH-43)

(NASA-TM-82230; AD-A091789; AD-E430526; ARBRL-TR-02261) Avail: NTIS HC A03/MF A01 CSCL 20/5

A pulsed, tunable dye laser has been used to excite each of the 3p, 3d, 4p, 5s and 4d levels of sodium atoms seeded into an atmospheric pressure acetylene-air flame. Three of these transitions, 3d, 5s and 4d, involve two-photon absorption from the ground 3s state. Fluorescence measurements furnish the populations of each of the levels populated by collisional transfer, enabling the deduction of relative energy transfer and quench rates among the four higher states. Fluorescence and opto-acoustic measurements under conditions near optical saturation of the 3p transition yield energy transfer rates and quenching rates for the two doublet components. Total collision-broadened linewidths are obtained by scanning the laser in a narrow-line mode. A qualitative experiment seeding the flame with both sodium and lithium suggests the presence of electronic-to-vibrational-to-electronic energy transfer. GRA

N81-14304*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

LASER EXCITATION OF FLUORESCENCE IN THE A-X SYSTEM OF NH

David R. Crosley (SRI International, Menlo Park, Calif.) and William R. Anderson Aug. 1980 42 p refs

(DA Proj. 1L1-61102-AH-43)

(NASA-TM-82231; AD-A091791; AD-E430525; ARBRL-TR-02260) Avail: NTIS HC A03/MF A01 CSCL 20/5

Laser excited fluorescence has been observed for the A triplet pi -X triplet sigma minus system of the NH radical in a discharge flow system of ammonia in molecular nitrogen or argon. About 100 lines have been catalogued for the (1,0) band near 305.0 nm and the (0,0) band near 336.0 nm. This report presents a list of the line positions and figures of the excitation scans carried out using a laser bandwidth of approximately 0.34 wavenumbers. GRA

N81-14305# Air Force Weapons Lab., Kirtland AFB, N. Mex.

NEUTRON AND GAMMA RADIATION EFFECTS ON GaAlAs LASER DIODES Final Report

Harro Ackerman and Thomas E. Walsh, Jr. Aug. 1980 83 p refs

(AF Proj. 8809)

(AD-A091795; AD-E299589; AFWL-TR-79-43) Avail: NTIS HC A05/MF A01 CSCL 09/1

The effects of two kinds of radiation on the performance of double heterojunction aluminum-gallium-arsenide (AlGaAs) laser diodes were investigated. One set of diodes received neutron radiation in a nuclear reactor; another set was exposed to gamma radiation from a cobalt-60 source. Each set contained two types of lasers, an RCA C30127 and a Laser Diode Laboratories LCW-10, both designed to operate continuously at room temperature. At neutron fluences of 10 to the 14th power n/sq cm, both types of diodes showed significant decreases in power output and external quantum efficiency, and increases in threshold current. There was no significant change in bias voltage versus forward current or in spectral composition of the light outputs at neutron fluences up to 10 to the 15th power n/sq cm. Under gamma radiation, the C30127 laser exhibited rapid degradation. A dosage of 10 to the 4th power rad(Si) reduced the output power by half. Threshold current, efficiency, and intensity distribution were all adversely affected. The damage factor at constant voltage was 1.5 x 10 to the minus 7th power rad to the minus 1 power. The LCW-10 performance improved to a dosage of 10 to the 6th power rad(Si) before degradation began. After 10 to the 8th power rad(Si), power output was still comparable to preirradiation values. Beam characteristics were not appreciably altered. The damage factor at constant voltage was 4 x 10 to the minus 8th power rad to the minus 1. GRA

N81-14306# Rochester Univ., N. Y. Dept. of Chemistry.

SURFACE MAGNETIC FIELD/LASER SYNERGISTIC EFFECTS ON THE PREDISSOCIATION OF ADSORBED DIATOMIC MOLECULES Interim Technical Report

Dilip K. Bhattacharyya, Kai-Shue Lam, and George F. Thomas Oct. 1980 34 p refs Submitted for publication

(Contract N00014-80-C-0472; NR Proj. 056-749)

(AD-A091747) Avail: NTIS HC A03/MF A01 CSCL 20/5

Synergistic effects of the surface magnetic field (SMF) and the laser on the predissociation of adsorbed diatomic molecules are studied theoretically. It is observed that the couplings between the laser-dressed and SMF-split molecular potentials create interference effects within the nuclear motion. These effects can cause enhancement of diminution in predissociation rates compared to the analogous gas-phase laser-induced process. SMF/laser-induced predissociation rates for a few specific examples are derived using the semiclassical S-matrix formalism, and results for the enhancement and diminution are discussed along with their dependence on laser power densities. GRA

N81-14307# Sanders Associates, Inc., Nashua, N. H. Defensive Systems Div.

HIGH POWER LASER AND MATERIALS INVESTIGATION Final Report, 31 Jul. 1978 - 28 Oct. 1979

E. P. Chicklis, R. C. Folweiler, T. M. Pollak, and J. Baer Jun. 1980 162 p refs

(Contract DE-AC08-78DP-40054)

(DOE/DP-40054/1) Avail: NTIS HC A08/MF A01

The concept of rare gas halide/solid state lasers was demonstrated by the lasing of Tm:YLF at 453nm pumped by the 353nm energy of XeF. Excited state densities of 5 x 10 to the 18th power/cu cm were attained and spectroscopic measurements show that up to 60% of the pump energy can be converted into useful stored energy. Alternative lasers and pumping schemes are also discussed. In all cases, the potential RGH/SS systems are evaluated in respect to internal efficiency and heat loading. Most of the studies of growth and growth scale-up of crystalline fluoride materials involved the host materials YLF (LiYF4) and KYF (KY3F10). Other materials described include KYF, KTb3l0 and EuF2. DOE

N81-14308# National Physical Lab., Teddington (England). Div. of Mechanical and Optical Metrology.

NPL-PTB INTERCOMPARISON OF IODINE-STABILIZED ION LASERS

P. Gill and F. Spieweck (Physikalisch-Technische Bundesanstalt, Brunswick, West Germany) Nov. 1979 23 p refs

(NPL-MOM-42) Avail: NTIS HC A02/MF A01

Comments on the results of a beat frequency comparison at NPL (March 1979) between an argon ion laser of PTB, stabilized at 515 nm with an external I2 cell, and mixed gas ion lasers of

NPL stabilized at 515 nm with internal I2 cells are given. Wavelength stabilities were in the range 1.10 to the minus 11th power lambda to 4.10 to the minus 11th power lamda for 10 sec averaging times. The beat frequency scatter measured during stabilization was greater than 1.5.10 to the minus 10th power for similar averaging times. Systematic wavelength differences of greater than 2.10 to the minus 10th power lamda between lasers were found when stabilized to hyperfine components of the 43-0 P(13) absorption, and greater than 5.10 to the minus 10th power lambda when stabilized to the 58-1 R(98) hyperfine components. Author

N81-14309# National Technical Information Service, Springfield, Va.
LASER CUTTING AND MACHINING: NONMETALS. CITATIONS FROM THE ENGINEERING INDEX DATA BASE Progress Report, 1970 - Jun. 1980
Guy E. Habercom, Jr. Jul. 1980 144 p Supersedes NTIS/PS-79/0891; NTIS/PS-78/0853
(PB80-814437; NTIS/PS-79/0891; NTIS/PS-78/0853) Avail: NTIS HC $30.00/MF $30.00 CSCL 20E

Techniques for electrothermal cutting and machining of glass, fabrics, wood, plastics, and other nonmetal products by use of controlled laser beams are described in reports gathered in worldwide literature surveys. Thermal analyses of materials exposed to laser beams are investigated. This updated bibliography contains 139 citations, 9 of which are new entries to the previous edition. GRA

N81-14310# National Technical Information Service, Springfield, Va.
LASER CUTTING AND MACHINING: METALS CITATIONS FROM THE ENGINEERING INDEX DATA BASE Progress Report, 1970 - Jun. 1980
Guy E. Habercom, Jr. Jul. 1980 322 p Supersedes NTIS/PS-79/0890; NTIS/PS-78/0852
(PB80-814445; NTIS/PS-79/0890; NTIS/PS-78/0852) Avail: NTIS HC $30.00/MF $30.00 CSCL 20E

Techniques for metalworking, machining, and cutting by use of controlled laser beams are investigated in these reports gathered in worldwide literature surveys. Precision finishing of metal surfaces is described. The thermal response of various metals is evaluated. This updated bibliography contains 326 citations, 29 of which are new entries to the previous edition. GRA

N81-14311# National Technical Information Service, Springfield, Va.
DYE LASERS. CITATIONS FROM THE NTIS DATA BASE Progress Report, 1979 - Jul. 1980
Diane M. Cavagnaro Aug. 1980 101 p Supersedes NTIS/PS-79/0894; NTIS/PS-78/0872
(PB80-813819; NTIS/PS-79/0894; NTIS/PS-78/0872) Copyright. Avail: NTIS HC $30.00/MF $30.00 CSCL 20E

Studies on dye laser theory, design, components, optical systems, and frequency range are presented in approximately 96 citations. Abstracts on lasing dyes, pumping, tuning, excitation, molecular structure, and modulation are included. Studies on dye laser use in spectroscopy are covered. GRA

N81-14312# National Technical Information Service, Springfield, Va.
DYE LASERS. CITATIONS FROM THE NTIS DATA BASE Progress Report, 1975-1978
Diane M. Cavagnaro Aug. 1980 223 p
(PB80-813801) Copyright. Avail: NTIS HC $30.00/MF $30.00 CSCL 20E

This bibliography covers studies on dye laser theory, design, components, optical systems, and frequency range. Abstracts on lasing dyes, pumping, tuning, excitation, molecular structure, and modulation are included. Studies on dye laser use in spectroscopy are covered. This updated bibliography contains 217 citations, none of which are new entries to the previous edition. GRA

N81-14313*# New Mexico Univ., Albuquerque. Technology Application Center.
HYDROGEN FLUORIDE AND DEUTERIUM FLUORIDE LASERS. CITATIONS FROM THE INTERNATIONAL AEROSPACE ABSTRACTS DATA BASE Progress Report, 1974 - Jul. 1980
Samuel C. Mauk Sep. 1980 60 p Sponsored by NASA and NTIS
(NASA-CR-163832; PB80-815871) Avail: NTIS HC $30.00/MF $30.00 CSCL 20E

Research cited from the international literature adresses various aspects of hydrogen fluoride and deuterium fluoride lasers. Topics covered include flows, laser outputs, molecular relaxation, molecular rotation, energy conversion efficiency, reaction kinetics, and laser materials. Continous wave and pulsed laser are considered. This updated bibliography contains 283 citations, 53 of which are new additions to the previous edition. GRA

N81-14314*# New Mexico Univ., Albuquerque. Technology Application Center.
ULTRAVIOLET LASERS. CITATIONS FROM THE INTERNATIONAL AEROSPACE ABSTRACTS DATA BASE Progress Report, 1975 - Jul. 1980
Samuel C. Mauk Sep. 1980 60 p Supersedes NTIS/PS-79/0861/9 Sponsored by NASA and NTIS
(NASA-CR-163831; PB80-815863; NTIS/PS-79/0861/9) Avail: NTIS HC $30.00/MF $30.00 CSCL 20E

Reports cited from the international literature describe various aspects of ultraviolet lasers including laser output, far ultraviolet radiation, electron pumping, optical pumping, and laser materials. Gas lasers, pulsed lasers, dye lasers, CO2 lasers, xenon fluoride lasers, and transversely excited atmospheric (TEA) lasers are considered. This updated bibliography contains 283 citations, 66 of which are new additions to the previous edition. GRA

N81-14315*# New Mexico Univ., Albuquerque. Technology Application Center.
X-RAY LASERS. CITATIONS FROM THE INTERNATIONAL AEROSPACE ABSTRACTS DATA BASE Progress Report, 1974 - Jul. 1980
Samuel C. Mauk Sep. 1980 31 p Supersedes NTIS/PS-79/0863/5 Sponsored by NASA and NTIS
(NASA-CR-163834; PB80-815913; NTIS/PS-79/0863/5) Copyright. Avail: NTIS HC $30.00/MF $30.00 CSCL 20E

Various aspects of X-ray lasers are discussed in approximately 122 citations. Included are laser plasmas and outputs, plasma radiation, far ultraviolet radiation, gamma rays, optical pumping, optical resonators, and electron transitions. Laser applications, laser materials, and laser fusion are also included. GRA

N81-14316*# New Mexico Univ., Albuquerque. Technology Application Center.
NEODYMIUM YAG LASERS. CITATIONS FROM THE INTERNATIONAL AEROSPACE ABSTRACTS DATA BASE Progress Report, 1976 - Jul. 1980
Samuel C. Mauk Sep. 1980 58 p Supersedes NTIS/PS-79/0862/7 Sponsored by NASA and NTIS
(NASA-CR-163835; PB80-815897; NTIS/PS-79/0862/7) Copyright. Avail: NTIS HC $30.00/MF $30.00 CSCL 20E

Various aspects of neodymium yag lasers are discussed in approximately 267 citations. Laser materials and outputs, laser mode locking; crystal, fiber, and nonlinear optics, optical pumping communications, energy conversion efficiency, and laser applications are covered. Pulsed, continuous wave, solid state, Q switched, infrared, and dye lasers are included. GRA

37 MECHANICAL ENGINEERING

Includes auxiliary systems (non-power); machine elements and processes; and mechanical equipment.

N81-14317* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
INSTALLING FIBER INSULATION Patent
David S. Wang (Rockwell International Corp., Downey, Calif.) and Aubrey D. Warren, inventors (to NASA) (Rockwell International Corp., Downey, Calif.) Issued 25 Nov. 1980 4 p Filed 15 Dec. 1978 Supersedes N79-17224 (17-08, p 0988) Sponsored by NASA
(NASA-Case-MSC-16973-1; US-Patent-4,235,060; US-Patent-Appl-SN-969756; US-Patent-Class-52-743;

US-Patent-Class-156-294; US-Patent-Class-52-232; US-Patent-Class-150-11) Avail: US Patent and Trademark Office CSCL 11C

A method for installing fragile, high temperature insulation batting in an elongated cavity or in a resilient wire sleeve to form a resilient seal. The batting is preformed to rough dimensions and wrapped in a plastic film, the film being of a material which is fugitive at a high temperature. The film is heat sealed and trimmed to form a snugly fit skin which overlaps at least at one end to permit attachment of a pull cord. The film absorbs the tensile force of pulling the film enclosed batting through the cavity or wire mesh sleeve and is subsequently driven off by high temperature baking, leaving only the insulation in the cavity or wire mesh sleeve.

Official Gazette of the U.S. Patent and Trademark Office

N81-14318* National Aeronautics and Space Administration. Pasadena Office, Calif.

POWER CONTROL FOR HOT GAS ENGINES Patent

William F. MacGlashan, inventor (to NASA) (JPL) Issued 21 Oct. 1980 10 p Filed 19 May 1978 Supersedes N78-25430 (16 - 16, p 2122) Sponsored by NASA (NASA-Case-NPO-14220-1; US-Patent-4,228,656; US-Patent-Appl-SN-907421; US-Patent-Class-60-518; US-Patent-Class-74-417) Avail: US Patent and Trademark Office CSCL 13I

A hot gas engine in which the expander piston of the engine is connected to an expander crankshaft. A displacer piston of the engine is connected to a separate displacer crankshaft which may or may not be coaxial with the expander crankshaft. A phase angle control mechanism used as a power control for changing the phase angle between the expander and displacer crankshaft is located between the two crankshafts. The phase angle control mechanism comprises a differential type mechanism comprised of a pair of gears, as for example, bevel gears, one of which is connected to one end of the expander crankshaft and the other of which is connected to the opposite end of the displacer crankshaft. A mating bevel gear is disposed in meshing engagement with the first two level gears to provide a phase angle control between the two crankshafts. Other forms of differential mechanisms may be used including conventional spur gears connected in a differential type arrangement.

Official Gazette of the U.S. Patent and Trademark Office

N81-14319* National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

METHOD AND TOOL FOR MACHINING A TRANSVERSE SLOT ABOUT A BORE Patent

Manuel A. David-Malig, (United Aircraft Corp., Sunnyvale, Calif.) Issued 26 Aug. 1980 6 p Filed 17 Oct. 1978 Supersedes N79-11249 (17 - 02, p. 0168) Sponsored by NASA (NASA-Case-LAR-11855-1; US-Patent-4,218,941; US-Patent-Appl-SN-953314; US-Patent-Class-82-1C; US-Patent-Class-82-1.2; US-Patent-Class-82-36R; US-Patent-Class-407-85; US-Patent-Class-407-117; US-Patent-Class-408-1R) Avail: US Patent and Trademark Office CSCL 13I

A method and apparatus for cutting a transverse slot about a bore of smaller diameter than that of the slot are disclosed. The invention consists of introducing a cutting head facing transversely to the bore, through the bore opening its distance from the mill shaft being progressively extended by the addition of spacers between the head and the shaft until the desired slot depth is obtained. The spacers are held in position by a cable passing from the cutting head through the series of spacers and out along the mill shaft. The mill shaft carrying the cutting head is moved transversely into the object wherein the slot is being cut as the object is being rotated thereabout by the mill table to which it is affixed.

Official Gazette of the U.S. Patent and Trademark Office

N81-14320* National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

DEVICE FOR COUPLING A FIRST VEHICLE TO A SECOND VEHICLE Patent

Arthur A. Rudmann, inventor (to NASA) Issued 26 Aug. 1980 10 p Filed 6 Feb. 1979 Supersedes N79-19364 (17-10, p 1285) (NASA-Case-GSC-12429-1; US-Patent-4,219,171; US-Patent-Appl-SN-009888; US-Patent-Class-244-161; US-Patent-Class-294-106; US-Patent-Class-414-1) Avail: US Patent and Trademark Office CSCL 13I

A device is disclosed, carried by a first vehicle such as an orbiting space shuttle, having a plurality of contact members for engaging and holding an annular ring on a second vehicle such as an orbiting payload. The contact members are connected to manipulator arms which are mounted at a fulcrum point and which are moved by an iris type mechanism. Movement of the manipulator arms causes the contact members to grasp or release the annular ring. Bumper devices are provided to axially align the annular ring and draw the contact members into engagement therewith.

Official Gazette of the U.S. Patent and Trademark Office

N81-14321 Florida Univ., Gainesville.

MASS SYNTHESIS FOR MULTIPLE BALANCING CRITERIA OF COMPLEX, PLANAR MECHANISMS Ph.D. Thesis

John Lane Elliott 1980 155 p

Avail: Univ. Microfilms Order No. 8029056

Methods are developed for the theoretical balancing for the dynamic properties of any balanceable mechanism. The dynamic properties directly covered are kinetic energy, inertia driving torque, inertia power, linear momentum, shaking force, total angular momentum, shaking moment, and rocking moment of the mechanism. A method for the closed form determination of the mass parameters and mass content of a mechanism to satisfy some specified balancing condition, either zero or non-zero is discussed. A matrix formulation of the dynamic properties of the planar mechanism is developed and is used to remove the linear dependencies of the expressions for the dynamic properties of the general planar linkage. Also, a simple method of developing the equations for the dynamic properties of planar mechanisms by simple algebraic substituion is presented. The balancing conditions for the mechanism are derived from this equation in its reduced, linearly independent form. Predictors for the number of terms to be expected in this reduced form of the equation are presented. Two examples are included. Dissert. Abstr.

N81-14322*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

COMPARISONS OF MODIFIED VASCO X-2 AND AISI 9310 GEAR STEELS

Dennis P. Townsend and Erwin V. Zaretsky Nov. 1980 19 p refs

(NASA-TP-1731; E-070) Avail: NTIS HC A02/MF A01 CSCL 13I

Endurance tests were conducted with four groups of spur gears manufactured from three heats of consumable electrode vacuum melted (CVM) modified Vasco X-2. Endurance tests were also conducted with gears manufactured from CVM AISI 9310. Bench type rolling element fatigue tests were conducted with both materials. Hardness measurements were made to 811 K. There was no statistically significant life difference between the two materials. Life differences between the different heats of modified Vasco X-2 can be attributed to heat treat variation and resultant hardness. Carburization of gear flanks only can eliminate tooth fracture as a primary failure mode for modified Vasco X-2. However, a tooth surface fatigue spall can act as a nucleus of a tooth fracture failure for the modified Vasco X-2.

Author

N81-14323# Royal Inst. of Tech., Stockholm (Sweden). Dept. of Strength of Materials and Solid Mechanics.

STATISTICAL EVALUATION OF J SUB C IN A 533-B WELD METAL AND HEAT AFFECTED ZONE

Fred Nilsson and Boerje Oestensson (Studsvik Energiteknik AB) Sep. 1979 14 p refs

(TRITA-HFL-0026) Avail: NTIS HC A02/MF A01

The risk of major fractors in the pressure vessel of a nuclear reactor is statistically analyzed. Test material from different plates is examined in terms of toughness of the weld material and the heat affected zone. S.F.

N81-14324# Lord Kinematics, Erie, Pa.

SERVICE LIFE DETERMINATION FOR THE UH-60-A (UTTAS) HELICOPTER ELASTOMERIC BEARINGS Final

Report, Aug. 1978 - Apr. 1980
Ernest P. Gaudette Apr. 1980 86 p
(Contract DAAG46-78-C-0030)
(AD-A091756; APE-79-021; USAAVRADCOM-TR-80-F-9; AMMRC-TR-80-25) Avail: NTIS HC A05/MF A01 CSCL 01/3

A method for predicting the endurance life of the elastomeric bearings on the UTTAS helicopter rotor is presented. The critical layers, based on elastomer strain, are determined analytically for these two bearings. Representative standard laboratory test specimens bonded with the specified elastomers are subjected to the same static and typical dynamic strains, and tested to failure. Two resulting S-N curves are reported, one for each of the two rotor elastomeric bearings. A short verification of Miner's cumulative damage theory is also conducted and reported. GRA

N81-14325# Pratt and Whitney Aircraft Group, West Palm Beach, Fla. Government Products Div.
IMPROVED CAPABILITIES TO DETECT INCIPIENT BEARING FAILURES Final Report, 1 May 1978 - 31 Mar. 1980
J. A. Alcorta, J. H. Mohn, and L. L. Packer Jul. 1980 86 p refs
(Contract F33615-78-C-2008; AF Proj. 3048)
(AD-A091687; PWA-FR-13036A; AFWAL-TR-80-2057) Avail: NTIS HC A05/MF A01 CSCL 13/9

A methodology using safe, low level radiation technique for the detection of wear in gas turbine engine mainshaft bearings has been developed and evaluated in a simulated gas turbine engine bearing environment. In conjunction with spectrometric analyses of engine oil samples, the radioactive tag will detect low levels of wear and will simultaneously indicate whether the tagged bearing is the source of the wear. Iron-55 is employed as the active tag owing to its low radiation levels, long half-life, and homogeneity of the isotope in the bearing rollers. The low levels of radiation existent in the tagged wear particles requires the separation of wear debris from the oil. Test results showed that the tagging method would provide a means of identifying the tagged rollers experiencing abnormal wear at the + or - 0.5 part per million iron level. Safe, low-level radioactive bearing roller tagging was achieved by waiting six months after neutron irradiation for the decay of the iron-59 and the chromium-51 gamma emitting radioisotopes. Wear measurements are conducted using the long half-life, low energy emitting X-rays from iron-55. The technique used for tagging, debris concentration, debris measurement, and bearing testing is given. GRA

N81-14326# Dynamic Controls, Inc., Dayton, Ohio.
AN INVESTIGATION OF A DIGITAL ELECTROHYDRAULIC SERVOVALVE Final Report, Apr. 1979 - Apr. 1980
Gavin D. Jenney Wright-Patterson AFB, Ohio AFFDL Jul. 1980 109 p
(Contract F33615-79-C-3605; AF Proj. 2403)
(AD-A091563; AFWAL-TR-80-3074) Avail: NTIS HC A06/MF A01 CSCL 09/5

This report describes the investigation of an electrohydraulic actuator which uses a digital servovalve control. The digital servovalve uses poppet solenoid valves and fixed orifices to replace the flow control functions of the conventional electrohydraulic analog servovalves. The digital servovalve configuration allows direct digital control of the direction and rate of an actuator used with the digital servovalve. The report describes the hardware fabricated for the investigation, some theoretical limitations of the technique and the test results from performance measurements made on the mechanization. The investigation was successful in demonstrating the validity of the concept and the performance characteristics of an example mechanization. GRA

N81-14327# United Technologies Corp., South Windsor, Conn. Power Systems Div.
COMPRESSOR CONFIGURATION AND DESIGN OPTIMIZATION FOR THE HIGH RELIABILITY GAS TURBINE Final Report
Diana L. Day and Fred H. Boenig Apr. 1980 54 p Prepared in cooperation with Pratt and Whitney Aircraft, West Palm Beach, Fla.
(Contract DE-AC03-79ET-15425)
(DOE/ET-15425/T1; GTR-2136) Avail: NTIS HC A04/MF A01

The compressor and diffuser preliminary designs were completed to define size and performance characteristics. The compressor has 9 stages and a predicted adiabatic efficiency of 88.35%. The diffuser selected is a conventional straight wall configuration with an equivalent conical angle of 8 degrees. An alternate diffuser configuration was recommended because of its excellent performance potential in high Mach number applications. The HTF compressor configuration appears to offer equivalent COE and reliability as compared to the Baseline Reliable Engine configuration, but at more conservative aerodynamic loading levels. J.M.S.

N81-14328# Argonne National Lab., Ill. Energy and Environmental Systems Div.
EVALUATION OF ADVANCED HYDRAULIC TURBOMACHINERY FOR UNDERGROUND PUMPED HYDROELECTRIC STORAGE. PART 1: SINGLE-STAGE REGULATED PUMP TURBINES FOR OPERATING HEADS OF 500 TO 1000 m
A. A. Frigo, C. A. Blomquist, and J. R. Degnan Oct. 1979 134 p refs
(Contract W-31-109-eng-38)
(ANL/ES-100-Pt-1) Avail: NTIS HC A07/MF A01

High head, large capacity turbomachinery is needed for the concept of underground pumped hydroelectric storage to be technically and economically attractive. Single stage, reversible, Francis type pump turbines with adjustable wicket gates offer the most economically attractive option for heads between about 500 and 1000 m. The feasibility of developing these types of machines for capacities up to 500 MW and operating heads up to 1000 m is evaluated. Preliminary designs are generated for six single stage pump turbines. The designs are for capacities of 350 and 500 MW and for operating heads of 500, 750, and 1000 m. Drawings of the machines along with material specifications and hydraulic performance data are included. DOE

N81-14329# Detroit Diesel Allison, Indianapolis, Ind.
***GAS TURBINE ENGINES AND TRANSMISSIONS FOR BUS DEMONSTRATION PROGRAMS* Technical Status Report, 31 Jan. - 30 Apr. 1980**
D. N. Nigro May 1980 7 p
(Contract DE-AC02-78CS-54867)
(COO-4867-07) Avail: NTIS HC A02/MF A01

Activities related to the procurement and delivery of 11 gas turbine engines, 11 automatic transmissions, and software items such as cost reports, drawings and parts lists for the bus demonstration program are reported. DOE

N81-14330# Bendix Corp., Kansas City, Mo.
ULTRASONIC ALUMINUM WIRE BONDING Final Report
J. R. Sim Sep. 1980 28 p
(Contract DE-AC04-76DP-00613)
(BDX-613-2485) Avail: NTIS HC A03/MF A01

An aluminum wire bonding process was developed. Techniques were developed for bonding large diameter wire to power transistor and evaporated gold. Bond schedules were made to be used in producing hybrid microcircuits. Calibration techniques utilizing an electromagnetic transducer to measure tool movement proved successful. The magnetic transducer is best suited as a trouble shooting tool. DOE

N81-14331# Westinghouse Electric Corp., Pittsburgh, Pa. Research and Development Center.
CERAMIC TURBINE COMPONENTS RESEARCH AND DEVELOPMENT. PART 2: EVALUATION OF MCrAlY/ZrO2 (Y2O3) THERMAL-BARRIER COATINGS EXPOSED TO SIMULATED GAS TURBINE ENVIRONMENTS Final Report
S. C. Singhal and S. Y. Yee Aug. 1980 79 p refs Sponsored by EPRI 2 Vol.
(EPRI Proj. 421-1)
(EPRI-AP-1539-Pt-2) Avail: NTIS HC A05/MF A01

The coating systems evaluated consisted of a MCrAlY (M = Ni or Ni/Co) bond coat and ZrO2 stabilized with a 12 wt percent Y2O3 overcoat, each deposited by plasma arc spray on Udimet 500 turbine alloy specimens. The corrosion testing was conducted in a pressurized turbine test passage at 2000 F gas

temperature using GT 2 diesel oil and that containing Na, V, P and S contaminants. Post test analysis showed that the coatings performed well when exposed to clean GT 2 fuel and that containing 1 ppM Na or 5 ppM Pb; but in the presence of vanadium and/or phosphorous in the fuel, the ZrO2 - 12 wt percent Y2O3 coating deteriorated through severe cracking and eventual spalling. Various possible causes for the oxide coating degradation are discussed. The thermal barrier coating concept is feasible for utility turbines, but coating development specifically for utility turbines burning residual fuels will be required. DOE

N81-14332# General Electric Co., Schenectady, N. Y. Gas Turbine Div.

DEVELOPMENT OF HIGH-TEMPERATURE TURBINE SUBSYSTEM TECHNOLOGY TO A TECHNOLOGY READINESS STATUS, PHASE 2 Quarterly Report, Jul. - Sep. 1979

M. W. Horner Oct. 1979 172 p

(Contract EX-76-C-01-1806)

(FE-1806-72) Avail: NTIS HC A08/MF A01

The program was divided into three phases: Program and System Definition, Technology Testing and Test Support Studies, and Technology Readiness Verification Test Program. The work scope for the overall three phases of the program encompasses the design, development, manufacture, and test of a GE-TRV turbine subsystem to be tested at a DOE facility. The objectives of Phase 2 are to: perform component design and technology testing in critical areas; perform system design and tradeoff analyses in sufficient depth to support the component design and test tasks; and update the Phase 1 combined cycle studies to evaluate the commercial viability of GE-TRV turbine system. DOE

N81-14333# California Univ., Livermore. Lawrence Livermore Lab.

TECHNOLOGY OF MACHINE TOOLS, VOLUME 1. EXECUTIVE SUMMARY

George P. Sutton Oct. 1980 65 p

(Contract W-7405-eng-48)

(UCRL-52960-1) Avail: NTIS HC A04/MF A01

The Machine Tool Task Force was formed to characterize the state of the art of machine tool technology and to identify promising future directions of this technology. Reports on various areas of the technology were contributed by experts in those areas. DOE

N81-14334# California Univ., Livermore. Lawrence Livermore Lab.

TECHNOLOGY OF MACHINE TOOLS. VOLUME 4: MACHINE TOOL CONTROLS

Ronald V. Miskell (Union Carbide Corp., Oak Ridge, Tenn.) Oct. 1980 376 p refs

(Contract W-7405-eng-48)

(UCRL-52960-4) Avail: NTIS HC A17/MF A01

The Machine Tool Task Force was formed to characterize the state of the art of machine tool technology and to identify promising future directions of this technology. Reports on various areas of the technology were contributed by experts in those areas. DOE

N81-14335# National Technical Information Service, Springfield, Va.

LASER WELDING. CITATIONS FROM THE ENGINEERING INDEX DATA BASE Progress Report, 1970 - Aug. 1980

William E. Reed Sep. 1980 306 p Supersedes NTIS/PS-79/1028; NTIS/PS-78/0984

(PB80-815202; NTIS/PS-79/1028; NTIS/PS-78/0984) Copyright. Avail: NTIS HC $30.00/MF $30.00 CSCL 13I

Reports from worldwide research are cited which deal with the development of techniques and procedures for laser welding and with the characteristics of the resulting welds. Process control, automation, and applications are also investigated. Materials welded include stainless steels, dissimilar metals, titanium, ceramics, and plastics. This updated bibliography contains 301 citations, 23 of which are new entries to the previous edition. GRA

N81-14336# Lehigh Univ., Bethlehem, Pa. Fritz Engineering Lab.

FRACTURE RESISTANCE OF FATIGUE CRACKED WELDED DETAILS Progress Report, 1 Jul. 1972 - 30 Jun. 1979

Hans Hausammann, Richard Roberts, George R. Irwin, and John W. Fisher Mar. 1980 92 p refs Sponsored in part by Pennsylvania Dept. of Transportation, Harrisburg.

(PB80-218217; LEHIGH/FL/386-11(80); FHWA-PA-72-3-11) Avail: NTIS HC A05/MF A01 CSCL 13B

Fracture tests were conducted on welded and rolled W41x30 beams of A36 and A441 steel with large fatigue cracks in their flanges. The fracture resistance of the fatigue cracked welded details was correlated with fracture control tests made on the same material. GRA

N81-14145*# High Vacuum Equipment Corp., Hingham, Mass.

USE OF CRYOPUMPS ON LARGE SPACE SIMULATION SYSTEMS

L. E. McCrary *In* NASA. Johnson Space Center The 11th Space Simulation Conf. 1980 p 71-78 refs (For primary document see N81-14138 05-31)

Avail: NTIS HC A19/MF A01 CSCL 13I

38 QUALITY ASSURANCE AND RELIABILITY

Includes product sampling procedures and techniques; and quality control.

N81-14337*# Ohio State Univ., Columbus.

ON THE FEASIBILITY OF QUANTITATIVE ULTRASONIC DETERMINATION OF FRACTURE TOUGHNESS: A LITERATURE REVIEW Final Report

L. S. Fu Washington Nov. 1980 39 p refs

(Grant NsG-3269)

(NASA-CR-3356; E-547) Avail: NTIS HC A03/MF A01 CSCL 14D

The three main topics covered are: (1) fracture toughness and microstructure, (2) quantitative ultrasonic and microstructure; and (3) scattering and related mathematical methods. Literature in these areas is reviewed to give insight to the search of a theoretical foundation for quantitative ultrasonic measurement of fracture toughness. The literature review shows that fracture toughness is inherently related to the microstructure and in particular, it depends upon the spacing of inclusions or second particles and the aspect ratio of second phase particles. There are indications that ultrasonic velocity attenuation measurements can be used to determine fracture toughness. The leads to a review of the mathematical models available in solving boundary value problems related to microstructural factors that govern facture toughness and wave motion. A framework towards the theoretical study for the quantitative determination of fracture toughness is described and suggestions for future research are proposed. Author

N81-14338# Materials Quality Assurance Directorate, London (England).

THE CONTROL OF MICROBIAL CONTAMINATION OF CUTTING FLUID ZX-1

G. R. Williams Nov. 1979 15 p *ref* Original contains color illustrations

(MQAD-TP-727; BR75025) Avail: NTIS HC A02/MF A01

A comparability study was conducted on the microbial spoilage of cutting fluid ZX-1 on two identical lathes. One machine was treated with a biocidal wash and used a 1 in 8 dilution of cutting fluid ZX-1 with added biocide, the other machine used a 1 in 8 dilution of untreated cutting fluid. Author

N81-14339# Naval Weapons Center, China Lake, Calif.

AUTOMATION OF A MAINTAINABILITY PREDICTION Interim Report

Kathy Cummings and Walter Hardesty Aug. 1980 70 p refs (AD-A091787; AD-E900027; NWC-TP-6198) Avail: NTIS HC A04/MF A01 CSCL 15/5

A maintainability prediction is automated through the use of the PASCAL programming language on the UNIVAC 1110.

This report provides the information necessary to describe the process for automating a maintainability prediction. It also includes instructions necessary for operating the Maintainability Prediction Computer Program. GRA

N81-14340# Florida State Univ., Tallahassee. Dept. of Statistics.
MULTIPARAMETER HYPOTHESIS TESTING AND ACCEPTANCE SAMPLING
Berger L. Roger Jul. 1980 12 p refs
(Contract DAAG29-79-C-0158)
(AD-A091607; FSU-STATISTICS-M555; TR-D48; ARO-16713.12-M) Avail: NTIS HC A02/MF A01 CSCL 12/1

The quality of a product might be determined by several parameters, each of which must meet certain standards before the product is acceptable. In this paper, a method of determining whether all the parameters meet their respective standards is proposed. The method consists of testing each parameter individually and deciding that the product is acceptable only if each parameter passes its test. This simple method has optimal properties including attaining exactly a prespecified consumer's risk and uniformly minimizing the producer's risk. These results are obtained from more general hypothesis testing results concerning null hypotheses consisting of the unions of sets.GRA

N81-14341# Los Alamos Scientific Lab., N. Mex.
BICYCLE: A COMPTUER CODE FOR CALCULATING LEVELIZED LIFE-CYCLE COSTS
R. W. Hardie Aug. 1980 38 p ref
(Contract W-7405-eng-36)
(LA-8493-MS) Avail: NTIS HC A03/MF A01

This report serves as a user's manual for the BICYCLE computer code. BICYCLE was specifically designed to calculate levelized life cycle costs for plants that produce electricity, heat, gaseous fuels, or liquid fuels. Included are (1) derivations of the equations used by BICYCLE, (2) input instructions, (3) sample case input, and (4) sample case output. DOE

39 STRUCTURAL MECHANICS

Includes structural element design and weight analysis; fatigue; and thermal stress.

For applications see *05 Aircraft Design, Testing and Performance* and *18 Spacecraft Design, Testing and Performance*.

N81-14342 Northwestern Univ., Evanston, Ill.
ELASTODYNAMIC ANALYSIS OF AN EDGE-CRACK NORMAL TO THE FREE SURFACE OF A HALF-SPACE Ph.D. Thesis
Daniel Albert Mendelsohn 1980 111 p
Avail: Univ. Microfilms Order No. 8026873

The two dimensional elastodynamic problem of an edge crack normal to the free surface of a linearly elastic, isotropic, and homogeneous half-spaces is investigated. Through the use of linear superposition the elastodynamic response of the cracked half-space is reduced to two mixed boundary value problems for the quarter-space, one representing the symmetric response and the other the anti-symmetric response with respect to the plane of the crack. These boundary value problems are then reduced to two uncoupled singular integral equations by the use of Fourier integral transforms. The integral equations are solved numerically and their solutions used to calculate the stress intensity factors, and crack opening displacements associated with various load configurations applied to the free surface of the half-space. The integral equations are also solved for the case of the scattering of elastic waves propagating from infinity and their solutions used to compute an asymptotic and the exact diffracted fields. The dependence of these results upon the dimensionless frequency is investigated for a fixed combination of Poisson's ratio and shear modulus. Dissert. Abstr.

N81-14343*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
VIBRATION CHARACTERISTICS OF A STEADILY ROTATING SLENDER RING
Frederick J. Lallman Dec. 1980 100 p refs
(NASA-TP-1775; L13386) Avail: NTIS HC A05/MF A01 CSCL 20K

Partial differential equations are derived to describe the structural vibrations of a uniform homogeneous ring which is very flexible because the radius is very large compared with the cross sectional dimensions. Elementary beam theory is used and small deflections are assumed in the derivation. Four sets of structural modes are examined: bending and compression modes in the plane of the ring; bending modes perpendicular to the plane of the ring; and twisting modes about the centroid of the ring cross section. Spatial and temporal characteristics of these modes, presented in terms of vibration frequencies and ratios between vibration amplitudes, are demonstrated in several figures. Given a sufficiently high rotational rate, the dynamics of the ring approach those of a vibrating string. In this case, the velocity of traveling wave in the material of the ring approaches in velocity of the material relative to inertial space, resulting in structural modes which are almost stationary in space. Author

N81-14344# Colorado School of Mines, Golden. Dept. of Metallurgical Engineering.
CHARACTERIZING AND IMPROVING THE TOUGHNESS OF THICK-SECTIONED 21/4Cr-1Mo ELECTROSLAG WELDMENTS Annual Report, Jul. 1979 - Aug. 1980
Glen R. Edwards and Robert H. Frost 1 Sep. 1980 138 p refs
(Contract DE-AS05-OR-12313)
(DOE/ET-12313/T1) Avail: NTIS HC A07/MF A01

Functional relations between electroslag welding process variables are developed and the process conditions under which successful electroslag welds can be produced are investigated. Functional relations are derived for: (1) weld velocity as a function of electrode velocity and weld geometry; (2) welding current as a power function of electrode velocity and potential; and (3) critical heat input for fusion of the parent plates as a function of current, potential, and weld geometry. S.F.

N81-14345*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
NONLINEAR DYNAMIC RESPONSE OF A UNIDIRECTIONAL MODEL FOR THE TILE/PAD SPACE SHUTTLE THERMAL PROTECTION SYSTEM
Jerrold M. Housner, Harold H. Edighoffer (GE, Philadelphia), and K. C. Park (Lockheed Missiles and Space Co., Palo Alto, Calif.) Nov. 1980 44 p refs
(NASA-TM-81901) Avail: NTIS HC A03/MF A01 CSCL 22B

A unidirectional analysis of the nonlinear dynamic behavior of the space shuttle tile/pad thermal protection system is developed and examined for imposed sinusoidal and random motions of the shuttle skin and/or applied tile pressure. The analysis accounts for the highly nonlinear stiffening hysteresis and viscous behavior of the pad which joins the tile to the shuttle skin. Where available, experimental data are used to confirm the validity of the analysis. Both analytical and experimental studies reveal that the system resonant frequency is very high for low amplitude oscillations but decreases rapidly to a minimum value with increasing amplitude. Analytical studies indicate that with still higher amplitude the resonant frequency increases slowly. The nonlinear pad is also responsible for the analytically and experimentally observed distorted response wave shapes having high sharp peaks when the system is subject to sinusoidal loads. Furthermore, energy dissipation in the pad is studied analytically and it is found that the energy dissipated is sufficiently high to cause rapid decay of dynamic transients. Nevertheless, the sharp peaked nonlinear responses of the system lead to higher magnification factors than would be expected in such a highly damped linear system. Author

N81-14346*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
FATIGUE PROPERTIES OF SHUTTLE THERMAL PROTECTION SYSTEM
James Wayne Sawyer and Paul A. Cooper Nov. 1980 25 p ref
(NASA-TM-81899) Avail: NTIS HC A02/MF A01 CSCL 20K

Static and cyclic load tests were conducted to determine the static and fatigue strength of the RIS tile/SIP thermal protection system used on the orbiter of the space shuttle. The material systems investigated include the densified and undensified LI-900 tile system on the .40 cm thick SIP and the densified and undensified LI-2200 tile system on the .23 cm (.090 inch) thick SIP. The tests were conducted at room temperature with a fully reversed uniform cyclic loading at 1 Hertz. Cyclic loading causes a relatively large reduction in the stress level that each of the SIP/tile systems can withstand for a small number of cycles. For example, the average static strength of the .40 cm thick SIP/LI-900 tile system is reduced from 86 kPa to 62 kPa for a thousand cycles. Although the .23 cm thick SIP/LI-2200 tile system has a higher static strength, similar reductions in the fatigue strength are noted. Densifying the faying surface of the RSI tile changes the failure mode from the SIP/tile interface to the parent RSI or the SIP and thus greatly increases the static strength of the system. Fatigue failure for the densified tile system, however, occurs due to complete separation or excessive elongation of the SIP and the fatigue strength is only slightly greater than that for the undensified tile system. Author

N81-14347*# California Univ., Los Angeles. Dept. of Mechanics and Structures.

DUAL METHODS AND APPROXIMATION CONCEPTS IN STRUCTURAL SYNTHESIS Final Report, Feb. 1978 - Aug. 1979

Claude Fleury and Lucien A. Schmit, Jr. Washington NASA Dec. 1980 223 p refs
(Grant NsG-1490)
(NASA-CR-3226) Avail: NTIS HC A10/MF A01 CSCL 20K

Approximation concepts and dual method algorithms are combined to create a method for minimum weight design of structural systems. Approximation concepts convert the basic mathematical programming statement of the structural synthesis problem into a sequence of explicit primal problems of separable form. These problems are solved by constructing explicit dual functions, which are maximized subject to nonnegativity constraints on the dual variables. It is shown that the joining together of approximation concepts and dual methods can be viewed as a generalized optimality criteria approach. The dual method is successfully extended to deal with pure discrete and mixed continuous-discrete design variable problems. The power of the method presented is illustrated with numerical results for example problems, including a metallic swept wing and a thin delta wing with fiber composite skins. Author

N81-14348# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Brunswick (West Germany). Abteilung Spannungs- und Stabilitaetsprobleme.

EXPERIMENTS WITH THIN-WALLED, ISOTROPIC CONES SUBJECTED TO AXIAL LOAD, AXIAL LOAD COMBINED WITH CONSTANT INTERNAL PRESSURE AND EXTERNAL HYDROSTATIC PRESSURE

Ulrich Heidemann Dec. 1979 42 p refs In GERMAN; ENGLISH summary Report will also be announced as translation (ESA-TT-670)
(DFVLR-Mitt-80-02) Avail: NTIS HC A03/MF A01; DFVLR, Cologne DM 10,20

Experimental buckling and postbuckling loads of thin walled isotropic cones are presented. The experimental buckling loads are compared with theoretical results for perfect cones with test boundary conditions. J.M.S.

N81-14349# Rolls-Royce Ltd., Derby (England). Aero Engine Div.

STRESS INTENSITY FACTORS FOR CRACKS WITH CIRCULAR AND ELLIPTIC CRACK FRONTS, DETERMINED BY 3D FINITE ELEMENT METHODS

A. C. Pickard 1980 17 p refs
(PNR-90035) Avail: NTIS HC A02/MF A01

Stress intensity factors were derived for corner, surface, and embedded cracks, with circular and elliptic crack fronts, in cuboid blocks for a variety of crack length to block with ratios. Three dimensional finite element methods were to model the problems, using the MARC finite element stress analysis program. The solutions obtained are compared with those in the literature, and are found to be substantially in agreement with those derived by finite element methods. Simple approximation formulae are derived to predict stress intensities for arbitrary sized elliptic cracks in cuboid blocks, up to crack length to block width ratios of 0.5. These are used, with crack propagation information generated from compact tension specimens to predict the propagation lives of some part elliptic bucket cracks in an industrial gas turbine power turbine disc. Author

N81-14350# Royal Inst. of Tech., Stockholm (Sweden). Dept. of Strength of Materials and Solid Mechanics.

FATIGUE THRESHOLD LEVEL IN STEEL

Pierre Mille Jul. 1979 21 p refs
(TRITA-HFL-0024; Pub-204) Avail: NTIS HC A02/MF A01

Fatigue crack propagation is discussed. The relationship between applied loading and crack propagation rate is explored. A method to determine the fatigue threshold level for steel is given. S.F.

N81-14351# Technische Hogeschool, Delft (Netherlands). Engineering Mechanics Lab.

GRAPHS OF THE THREE-DIMENSIONAL STATE OF STRESS AT THE VERTEX OF A QUARTER-INFINITE CRACK IN A HALF-SPACE

J. P. Benthem and Th. Douma Feb. 1980 110 p refs
(NTHD-123; Rept-677) Avail: NTIS HC A06/MF A01

Spherical coordinates are R, theta, phi. The half space extends in theta $< pi/2$. The crack occurs along phi = 0. States of stress were previously considered in terms of the Cartesian displacement and stress components which leave the half space surface and crack surfaces traction free. Only a discrete spectrum of eigenvalues s is possible and the most important s value is that closest to the limiting value Re $s > -1/2$. To each eigenvalue s belongs an eigenfunction, i.e., a state of displacement and stress which may be described (taking R = 1) with the aid of only two of the spherical coordinates (theta and phi). For 5 Poisson's ratios, computer plotted graphs are given for these displacements and stresses which belong to the most important eigenvalues. A.R.H.

N81-14352# Technische Hogeschool, Delft (Netherlands). Engineering Mechanics Lab.

REFINED THEORY FOR BENDING OF PERFORATED PLATES

P. Meijers and A. M. A. vanderHeijden May 1980 44 p refs
(WTHD-125; Rept-679) Avail: NTIS HC A03/MF A01

A theoretical analysis and numerical results are presented for bending and torsion of thin perforated plates with a regular pattern of equal and equally spaced circular holes. Similar results were obtained for plane strain and generalized plane stress conditions, they are approximate solutions for bending and torsion of very thick plates. Significant differences in stress concentration factors and effective elastic constants in bending of thin and thick plates, make it of practical interest to know more accurately the transition between these two limit cases. S.F.

N81-14353# Southampton Univ. (England). Inst. of Sound and Vibration Research.

STATIC AND DYNAMIC RESPONSE OF AN ALUMINUM ALLOY PANEL HAVING A CENTRAL OPENING WITH COMBINED IN-PLANE BIAXIAL STATIC LOADING AND ACOUSTIC EXCITATION

P. K. Datta and R. G. White Aug. 1979 81 p refs
(ISVR-TR-103) Avail: NTIS HC A05/MF A01

The static and dynamic response of an aluminum alloy panel, having a central opening, subjected to combined in-plane static tensile loading and acoustic excitation is described. The test specimens were tested in an acoustic tunnel to maximum sound pressure level of 145 dB with in-plane uniaxial and biaxial tensile loading. The local buckling of the free edge of the opening and the plate vibration characteristics were also investigated. The nonlinear behavior of the plate having a central opening was examined under sinusoidal and broad band random excitation. Crack propagation data from the high stress concentration zone at the tips of the opening under acoustic excitation are presented. Author

N81-14354# Aeronautical Research Inst. of Sweden, Stockholm. Structures Dept.

SPECTRUM FATIGUE TESTING OF SIMPLE TEST SPECIMENS CONTAINING ARTIFICIAL DEFECTS Final Report

Bjoern Palmberg 1980 54 p refs

(Contract FMV-F-K-82223-77-001-21-001)

(FAA-TN-HU-2108; ISSN-SW-0081-5640) Avail: NTIS HC A04/MF A01

Utilizing loads spectra, the fatigue performance of 46 open hole flat specimens made of 3 mm thick, clad sheet 7075-T6 (Saab-Scania 3627-48) was investigated. In all specimens, a single corner defect at the hole edge was introduced using electrical discharge machining. The loads spectra were representative of wing or fin loading and were applied at essentially three maximum stress levels of 234, 156 and 104 MPa. Fatigue lives were obtained for open hole specimens with reamed as well as with drilled holes and also for specimens with tightened and untightened bolts installed in clearance fit drilled holes. Eight additional specimens with open holes were subjected to constant amplitude loading and the crack growth rate was determined. Generally, about 15 - 40 percent of the specimen fatigue life was spent before the fatigue crack was detected. A.R.H.

N81-14355# Sandia Labs., Albuquerque, N. Mex. Nondestructive Testing Technology Div.

ULTRASONIC MEASUREMENT OF ELASTIC MODULI OF 17-4 PH STAINLESS STEEL AND URANIUM - 2 MOLYBDENUM FROM MINUS 40 DEG C TO 800 DEG C

John H. Gieske Oct. 1980 32 p refs Sponsored by DOE

(SAND-80-1121) Avail: NTIS HC A03/MF A01

Young's Modulus, shear modulus, and Poisson's ratio for 17-4 PH stainless steel and Uranium-2 Molybdenum are calculated from ultrasonic longitudinal and shear velocities determined from -40 C to 800 C. The ultrasonic velocities were determined at elevated temperatures using a through-transmission buffer rod arrangement. An indium gallium slurry bond was used as an ultrasonic couplant between Cupernickel 10 alloy buffer rods and the specimen. Microstructural changes and phase transitions in the specimens are evident from the temperature dependence of the ultrasonic data. DOE

N81-14356# Sandia Labs., Albuquerque, N. Mex. Nondestructive Testing Technology Div.

ELASTIC MODULI OF BORON CARBIDE/COPPER COMPOSITES FROM MINUS 40 DEG C TO 800 DEG C BY ULTRASONIC METHODS

John H. Gieske Oct. 1980 63 p refs Sponsored by DOE

(SAND-80-0881) Avail: NTIS HC A04/MF A01

An ultrasonic through-transmission technique for high attenuating materials was developed to determine the ultrasonic longitudinal and shear velocities in B4c/Cu composites to 800 C. Ultrasonic velocity data was used to calculate Young's modulus, shear modulus, and Poisson's ratio for the composites from -40 C to 800 C. DOE

N81-14357# Washington Univ., St. Louis, Mo.

J-INTEGRAL ELASTIC PLASTIC FRACTURE MECHANICS EVALUATION OF THE STABILITY OF CRACKS IN NUCLEAR REACTOR PRESSURE VESSELS Final Report, 31 May - 30 Sep. 1979

M. P. Gomez, R. M. McMeeking, and D. M. Parks Jun. 1980 81 p refs Sponsored by DOE

(SAND-80-0688; ALO-86; WUTA-7972-04) Avail: NTIS HC A05/MF A01

The development of analytical techniques to determine the loading parameters and practical procedures for assessing crack stability by comparison of loading and material parameters is reported. Trends concerning the influence of mode of crack growth, as characterized by rate of change of crack shape, on the tendency toward crack instability are presented. T.M.

N81-14358# Cornell Univ., Ithaca, N. Y. Materials Science and Engineering Div.

MECHANICAL PROPERTIES OF CRYSTALLINE SOLIDS Progress Report, 1 Dec. 1979 - 30 Nov. 1980

Che-Yu Li, S. Mukherjee, and E. W. Hart 1 Sep. 1980 71 p refs

(Contract DE-AC02-76ER-02172)

(DOE/ER-02172/35) Avail: NTIS HC A04/MF A01

The work performed in the materials area included: (1) development of microstructural basis for a second generation state variable deformation model; (2) continuation of the work on a unified model for grain boundary anelasticity and grain boundary sliding; (3) continued investigation of the grain boundary cavitation process in the Zircaloys; and (4) application of a state variable approach in materials characterization. In the mechanics area a finite element analysis of thermal stress transients in structures was performed and the boundary element method was applied to plate bending and fracture. A.R.H.

N81-14359# Cornell Univ., Ithaca, N. Y. Dept. of Theoretical and Applied Mechanics.

A BOUNDARY ELEMENT FORMULATION FOR PLANAR TIME-DEPENDENT INELASTIC DEFORMATION OF PLATES WITH CUTOUTS

Subrata Mukherjee and Mahesh Morjaria Feb. 1980 39 p refs

(Contract EG-77-S-02-2733)

(DOE/ER-02733/26) Avail: NTIS HC A03/MF A01

A boundary element formulation using augmented kernels is presented for problems of planar, inelastic deformation of plates with cutouts. In this approach, two fundamental solutions of the biharmonic equation are augmented so that the resultant kernels yield the stress distributions for point concentrations in an infinite plate with a traction free cutout. Thus, the effect of the cutout on the stress field is incorporated into the kernels and the cutout boundary need not be modelled discretely in a numerical application. The specific kernels for a plate with a circular cutout are derived. Analytical illustrative examples for an uniform circular plate undergoing elastic deformation and a circular plate with a circular cutout undergoing inelastic deformation are carried out and the formulation is shown to yield the correct expressions for stresses in these cases. DOE

N81-14360# Cornell Univ., Ithaca, N. Y. Dept. of Theoretical and Applied Mechanics.

NUMERICAL ANALYSIS OF PLANAR, TIME-DEPENDENT INELASTIC DEFORMATION OF PLATES WITH CRACKS BY THE BOUNDARY ELEMENT METHOD

Mahesh Morjaria and Subrata Mukherjee Feb. 1980 41 p refs

(Contract EG-77-S-02-2733)

(DOE/ER-02733/27) Avail: NTIS HC A03/MF A01

The specific kernels for plates with elliptic cutouts are first derived. These kernels are then used to obtain numerical solutions for time-dependent stress fields near stationary crack tips in finite plates. A crack is modelled as a very narrow ellipse and both remote tensile (mode one) and remote shear (mode two) loadings are considered. The deformation of the plate material is assumed to be described either by the equations of power law creep on the combined creep-plasticity constitutive model of Hart. DOE

N81-14361# Cornell Univ., Ithaca, N. Y. Dept. of Theoretical and Applied Mechanics.

BOUNDARY ELEMENT ANALYSIS OF TIME-DEPENDENT INELASTIC DEFORMATION OF CRACKED PLATES LOADED IN ANTI-PLANE SHEAR

Subrata Mukherjee and Mahesh Mortaria Jul. 1980 37 p refs

(Contract EG-77-S-02-2733)

(DOE/ER-02733/28) Avail: NTIS HC A03/MF A01

The inelastic deformation of cracked plates loaded in anti-plane shear was investigated. Modified kernels were used so that the only unknowns in the integral equations are source strengths on the outer boundary of the plate. It is proved that this formulation guarantees traction free cracks as well as single valued displacements on the crack boundary. Numerical results for stresses are presented for various loading histories with the plate material described by an elastic-nonlinear power law creep constitutive model and a stationary crack modelled as a very thin ellipse. DOE

N81-14362# Cornell Univ., Ithaca, N. Y. Dept. of Theoretical and Applied Mechanics.

THE INELASTIC BENDING OF A NICKEL BEAM AT

SEVERAL TEMPERATURES: EXPERIMENT AND PREDICTION
J. A. Mautz and E. W. Hart Jul. 1980 31 p refs
(Contract EG-77-S-02-2733)
(DOE/ER-02733/29; COO-2733-29) Avail: NTIS HC A03/MF A01

The bending response of a nickel prismatic beam under four point loading at 25 C, 200 C, and 300 C was investigated. The specimens were subjected to histories of steady applied moment with a sequence of step changes both positive and negative. The measured results are compared with predictions based on Hart's constitutive equations. The experimental conditions and procedures are described. The experiment and the predictions are compared with prior studies. DOE

N81-14363# Pennsylvania Univ., Philadelphia. Dept. of Materials Science and Engineering.
MECHANISMS OF DAMAGE ACCUMULATION IN TIME-DEPENDENT CYCLIC DEFORMATION Progress Report, 1 Jan. - 31 Dec. 1980
Campbell Laird Aug. 1980 15 p refs
(Contract DE-AC02-80ER-10570)
(DOE/ER-10570/1) Avail: NTIS HC A02/MF A01

Two kinds of damage produced in cyclic creep were investigated. The change in dislocation density and arrangement in copper and damage phenomena involving precipitates in Cr-Mo-V rotor steel. In copper tested at low temperatures, strain bursts were recognized for the first time in polycrystals of a pure metal in both cyclic and static creep. The stress regime for producing bursts was defined and the dislocation structures associated with them studied. Interpretation based on instabilities associated with the persistent slip bands which form in regular fatigue is being explored. For the study of rotor steel, three batches of material were obtained and characterized and a new high temperature apparatus built to do tests. A literature review justifying the choice of steels and tests is provided. DOE

N81-14364# Cornell Univ., Ithaca, N. Y. Dept. of Theoretical and Applied Mechanics.
FINITE ELEMENT ANALYSIS OF TIME-DEPENDENT INELASTIC DEFORMATION IN THE PRESENCE OF TRANSIENT THERMAL STRESSES
Mahesh Mojaria and Subrata Mukherjee Jan. 1980 26 p refs
(Contract DE-AS02-76ER-02733)
(COO-2733-25) Avail: NTIS HC A03/MF A01

A finite element formulation for the solution of time dependent inelastic deformation problems for metallic structures, in the presence of transient thermal stresses, is presented. A rate formulation of the equation is used and any of a number of recently proposed combined creep plasticity constitutive models with state variables can be adopted to describe material behavior. The computer program developed can solve planar (plane strain and stress) and axisymmetric problems. Using one of the above mentioned constitutive models, numerical results are presented for several illustrative problems, and comparisons of results, using either the quasi-steady or the unsteady diffusion equation for the determination of the temperature field, are carried out. DOE

N81-14167*# Battelle Columbus Labs., Ohio.
THERMAL STRESS RESPONSE OF GENERAL PURPOSE HEAT SOURCE (GPHS) AEROSHELL MATERIAL
I. M. Grinberg, L. E. Hulbert, and R. G. Luce *In* NASA. Johnson Space Center The 11th Space Simulation Conf. 1980 p 378-389 refs (For primary document see N81-14138 05-31)
Avail: NTIS HC A19/MF A01 CSCL 20K

42 GEOSCIENCES (GENERAL)

N81-14365*# California Inst. of Tech., Pasadena. Seismological Lab.
THEORETICAL INVESTIGATION OF LUNAR AND PLANETARY INTERIORS Final Technical Report, 1 Jun. 1967 - 30 Jun. 1980
Don L. Anderson 30 Jun. 1980 104 p refs
(Grant NGL-05-002-069)
(NASA-CR-163822; Contrib-3291) Avail: NTIS HC A06/MF A01 CSCL 08G

Several aspects of the Earth's planetary structure are discussed. Particular attention is given to the thermal state of the lower mantle and the structural properties of the lithosphere. For individual titles, see N81-14366 through N81-14369.

N81-14366*# California Inst. of Tech., Pasadena. Seismological Lab.
CONVECTION, COMPOSITION AND THE THERMAL STATE OF THE LOWER MANTLE Final Technical Report c46
Raymond Jeanloz and Frank M. Richter *In* Its Theoret. Invest. of Lunar and Planetary Interiors 30 Jun. 1980 31 p refs
(For primary document see N81-14365 05-42)
(Grant NGL 05-002-069)
Avail: NTIS HC A03/MF A01 CSCL 08G

A thermal model for the lower Earth mantle which is constructed from petrologically derived estimates of the temperature in the transition zone and from an adiabat based on the thermal properties and MgO and SiO2 measured at high pressures. Superadiabatic contributions to the geotherm through the lower mantle, including those from possible phase transformations but excluing those from thermal boundary layers, are negligibly small. A thermal boundary layer is required at the base of the mantle in order to satisfy our estimate of the lowest possible temperature in the core (about 2800 K); its thickness of about 100 km is well constrained. It is shown that a thermal boundary layer is associated with a chemical discontinuity either at the top of the lower mantle or near its base (D double prime region). If seismological data require the D double prime layer to be significantly thicker than about 100 km, this is support for a chemically distinct D double prime region with multiple thermal boundary layers. Otherwise, the results suggest that the upper and lower mantle may be chemically distinct, hence precluding whole-mantle convection. R.C.T.

N81-14367*# California Inst. of Tech., Pasadena. Seismological Lab.
PLATE TECTONICS ON VENUS Final Technical Report c91
Don L. Anderson *In* Its Theoret. Invest. of Lunar and Planetary Interiors 30 Jun. 1980 10 p refs (For primary document see N81-14365 05-42)
(Grant NGL-05-002-069)
Avail: NTIS HC A03/MF A01 CSCL 03B

The factors contributing to the high surface temperature of Venus were investigated. The implications of this high surface suggest that a permanently buoyant lithosphere exists as well as a thick balsic crust. Terrestrial style tectonics with deep subduction and crustal recycling is not possible. Overthickened basaltic crust partially melts instead of converting to eclogite. Because mantle magmas do not have convenient acess to the surface the Ar40 abundance in the atmosphere should be low. Venus provides an analog to Archean tectonics on the Earth. R.C.T.

N81-14368*# California Inst. of Tech., Pasadena. Seismological Lab.
HOTSPOTS, BASALTS AND THE EVOLUTION OF THE MANTLE Final Technical Report c46
Don L. Anderson *In its* Theoret. Invest. of Lunar and Planetary Interiors 30 Jun. 1980 33 p refs (For primary document see N81-14365 05-42)
(Grant NGL-05-002-069)
Avail: NTIS HC A03/MF A01 CSCL 08G

Trace element concentration patterns of continental and ocean island basalts and of midocean ridge basalts were investigated. The relative sizes of the source regions for these fundamentally different basalt types is estimated from the trace element enrichment/depletion patterns. Their combined volume occupies most of the mantle above the 670 km discontinuity. The separate source regions are the result of early mantle differentiation and crystal fractionation from the resulting melt. The MORB source evolved from an eclogite cumulate which lost its late stage enriched fluids at various times to the shallower mantle and continental crust. The MORB source is primarily

garnet and clinopyroxene, while the continental and ocean island basalt source is a garnet peridotite that has experienced secondary enrichment. These relationships are consistent with the evolution of a terrestrial magma ocean. R.C.T.

N81-14369*# California Inst. of Tech., Pasadena. Seismological Lab.
BASALTIC VOLCANISM CONTRIBUTION Final Technical Report c46
Don L. Anderson *In* Its Theoret. Invest. of Lunar and Planetary Interiors 30 Jun. 1980 12 p refs (For primary document see N81-14365 05-42)
(Grant NGL-05-002-069)
Avail: NTIS HC A02/MF A01 CSCL 08K

Cosmological models were tested against the structure and composition of the Earth as deduced from seismological data. It is shown that the Earth appears to be a differentiated body with the crust, mantle, core and inner core being the main subdivisions. Presently forming oceanic crust are understood as a differentiated, or partial melt fraction, of the upper mantle and petrological models of the upper mantle agree well with the seismological data. R.C.T.

N81-14370# Royal Netherlands Meteorological Inst., De Bilt.
METEOROLOGICAL AND OCEANOGRAPHIC OBSERVATIONS ON BOARD NETHERLANDS LIGHT VESSELS AND THE LIGHT PLATFORM GOEREE IN THE NORTH SEA
1980 157 p In DUTCH and ENGLISH
(KNMI-141-27) Avail: NTIS HC A08/MF A01; Roy. Neth. Meteorol. Inst., De Bilt FL 17,50

Parameters for observation included precipitation, cloud cover, atmospheric turbulence, and wind measurements. Also included were sea states, waterwave energy, and surface temperatures for the North Sea. T.M.

43 EARTH RESOURCES

Includes remote sensing of earth resources by aircraft and spacecraft; photogrammetry; and aerial photography.

For instrumentation see *35 Instrumentation and Photography*.

N81-14371* National Aeronautics and Space Administration, Washington, D. C.
EARTH RESOURCES: A CONTINUING BIBLIOGRAPHY WITH INDEXES
Oct. 1980 109 p
(NASA-SP-7041(27)) Avail: NTIS HC $10.50 CSCL 05B

This bibliography lists 337 reports, articles, and other documents introduced into the NASA scientific and technical information system between July 31, 1980 and September 30, 1980. Emphasis is placed on the use of remote sensing and geophysical instrumentation in spacecraft and aircraft to survey and inventory natural resources and urban areas. Subject matter is grouped according to agriculture and forestry, environmental changes and cultural resources, geodesy and cartography, geology and mineral resources, hydrology and water management, data processing and distribution systems, instrumentation and sensors, and economic analysis. Author

N81-14372*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
SEASAT VIEWS NORTH AMERICA, THE CARIBBEAN, AND WESTERN EUROPE WITH IMAGING RADAR
J. P. Ford, R. G. Blom, M. L. Bryan, M. I. Daily, T. H. Dixon, C. Elachi, and E. C. Xenos 1 Nov. 1980 135 p refs
(Contract NAS7-100)
(NASA-CR-163825; JPL-Pub-80-67) Avail: NTIS HC A07/MF A01 CSCL 17I

Forty-one digitally correlated Seasat synthetic-aperture radar images of land areas in North America, the Caribbean, and Western Europe are presented to demonstrate this microwave orbital imagery. The characteristics of the radar images, the types of information that can be extracted from them, and certain of their inherent distortions are briefly described. Each atlas scene covers an area of 90 X 90 kilometers, with the exception of the one that is the Nation's Capital. The scenes are grouped according to salient features of geology, hydrology and water resources, urban landcover, or agriculture. Each radar image is accompanied by a corresponding image in the optical or near-infrared range, or by a simple sketch map to illustrate features of interest. Characteristics of the Seasat radar imaging system are outlined. Author

N81-14373# Technische Hogeschool, Delft (Netherlands). Dept. of Aerospace Engineering.
ESTIMATION ON THE WETTZELL COORDINATES FROM SATELLITE LASER RANGING AT KOOTWIJK, SAN FERNANDO AND WETTZELL
K. F. Wakker and B. A. C. Ambrosius Mar. 1980 25 p refs Presented at the EROS Plenary Meeting, Grasse, France, 15-17 Apr. 1980
(VTH-LR-296) Avail: NTIS HC A02/MF A01

Various estimates were obtained, based on single arc and two arc solutions. The arcs were formed from 58 passes of three satellites over the Kootwijk, San Fernando and Wettzell stations during the period July 11 to August 4, 1978. The results are compared with other existing solutions. Author

N81-14374# Helsinki Univ. of Technology, Otaniemi (Finland). Radio Lab.
THE ABILITY OF PASSIVE MICROWAVE SYSTEMS TO DETECT SEA ICE
Martti Tiuri and Martti Hallikainen 1979 13 p refs Presented at WMO Workshop on Remote Sensing of Sea Ice, 1978
(REPT-S-113; ISBN-951-751-702-5) Avail: NTIS HC A02/MF A01

The large difference in the brightness temperature of the open sea and that of the ice covered sea, microwave radiometers are useful in detecting the extent of sea ice. At UHF and lower microwave frequencies sea ice can be considered to consist of homogeneous horizontal layers with smooth surfaces. The exact calculation of brightness temperature is then possible. In the case of the salinity sea ice or thin normal sea ice, the dependence of the brightness temperature on the ice thickness can be applied to the thickness measurement. The accuracy of the method depends on how well the salinity and the surface temperature of ice are known. The drawback of passive systems is their sensitivity to interference caused by many existing radio transmitters as experienced during helicopter reconnaissance over the Gulf of Bothnia in the Baltic. A.R.H.

N81-14375# Research Inst. of National Defence, Stockholm (Sweden).
EARTH RESOURCES
Eskil Block Jan. 1980 90 p refs
(FOA-C-10148-M3) Avail: NTIS HC A05/MF A01

Basic scientific knowledge (dating methods and instruments, understanding of physical and biological systems) must be used extensively when attacking any large resources problem. However, the world is so politically constituted that the use of scientific knowledge may have increased opportunities to waste Earth resources and create new conflicts. A research policy must be established which disseminates results of scientific discoveries and promotes useful applications of the techniques developed. Advances in understanding of land and sea, air and weather, and our place in the solar system are summarized. The implementation and controversies of research policies in Sweden and elsewhere are considered. A.R.H.

N81-14376# Naval Research Lab., Washington, D. C.
EXPERIMENTAL SEA SLICKS IN THE MARSEN (MARITME REMOTE SENSING) EXERCISE Interim Report
William D. Garrett and William R. Barger 30 Oct. 1980 22 p refs
(RR03103)
(AD-A091850; NRL-8454) Avail: NTIS HC A02/MF A01 CSCL 07/3

Experimental slicks with various surface properties were generated in the North Sea as part of the MARSEN (Maritime Remote Sensing) exercise. The one-molecule thick slicks, as large as 2.3 square kilometers in area, were formed from nontoxic, organic substances and allowed to drift through the area observed by sensors mounted on the research platform Nordsee. The slicks

were also generated in coordination with overflights of aircraft equipped with remote sensing instrumentation. Because of the numerous effects of surface films on air-sea interfacial processes, these experiments were designed to enhance the understanding of energy exchange between wind and water and of the interactions between capillary and gravity waves. In addition, information was obtained on the influence of sea surface films on the interpretation of signals received by remote sensing systems. Criteria for the selection of film-forming material for experimental slicks and various techniques for slick generation are discussed. Physical processes modified by natural and man-made surface films are reviewed, along with the resulting impacts of such modifications of the air-water interface on remotely sensed signals. The characteristics of the MARSEN surface films will be described as well as preliminary results from the remote systems which sensed the slicks. GRA

N81-14377# Army Materiel Systems Analysis Activity, Aberdeen Proving Ground, Md.
SEEFAR: AN IMPROVED MODEL FOR PRODUCING LINE-OF-SIGHT MAPS
Barbara D. Broome Sep. 1980 89 p refs
(DA Proj. 1R6-65706-M-541)
(AD-A091855; AMSAA-TR-225) Avail: NTIS
HC A05/MF A01 CSCL 08/2

This report describes an improved model for producing line-of-sight maps. Many models determine whether a target is within view by drawing a terrain profile between observer and target and examining it to see if it interferes with line of sight; this requires generating a completely new profile for each target position. The new model avoids this time-consuming profile for each target position. The new model avoids this time-consuming profile generation by dynamically recording the characteristics of a 'running horizon' as computations are made for points further away from the observer. For each target point, a check is made to determine whether the target is behind the 'horizon'. This new approach results in a dramatic savings in both storage and computing time requirements. GRA

N81-14378# Goodyear Aerospace Corp., Akron, Ohio.
FEATURE TAGGING Final Report, Jun. 1979 - Apr. 1980
G. A. Biecker, J. L. Potter, and D. S. Paden 1 Apr. 1980 32 p
(Contract DAAK70-79-C-0070)
(AD-A091691; GER-16753; ETL-190227) Avail: NTIS
HC A03/MF A01 CSCL 08/2

The automated recognition of cartographic symbols such as dual cased roads and railroads would significantly reduce the manual labor involved in generating digital cartographic data bases. The effort described in this report was successful in detection 96.5% of the railroad symbol components. There were only 1.5% false taggings. 98.3% of the dual cased roads were tagged with only .7% false taggings. Goodyear Aerospace Corporation (GAC) believes that minor modifications to the algorithms would produce near perfect results for both features. Because of the success of this effort, GAC feels that the project should be continued to allow evaluation on existing map sheet data and expansion of the effort to additional cartographic symbols. GRA

N81-14379# Hebrew Univ., Jerusalem (Israel). Inst. of Earth Sciences.
ARID ZONE GEOSYSTEMS Final Technical Report, Aug. 1978 - Jan. 1980
Asher P. Schick Sep. 1980 168 p refs
(AD-A091689; DA-ERO-78-G-111) Avail: NTIS
HC A08/MF A01 CSCL 08/8

This report presents the second comprehensive collection and analysis of geosystem-oriented environmental data based on the Nahal Yael Research Watershed, located in the Negev Desert just north of Eilat, Israel. It reflects transition from direct measurements of basic rainfall, streamflow, sediment transport, and other data to an environmental modelling approach which integrates these data on a dynamic process basis. GRA

N81-14380# Tennessee Univ., Knoxville. Dept. of Civil Engineering.
AIR FORCE RUNOFF MODEL (AFRUM) USER MANUAL DOCUMENTATION Final Report, Oct. 1978 - Jul. 1980
Donald E. Overton, George W. Schlossnagle, and Michael G. Siebert Tyndall AFB, Fla. AFESC Jul. 1980 82 p refs
(Contract F08635-77-C-0254; AF Proj. 1900)
(AD-A091717; AFESC/ESL-TR-80-29) Avail: NTIS
HC A05/MF A01 CSCL 04/2

The Air Force Runoff Model (AFRUM) is a stormwater runoff simulation model designed to predict stormwater flow and quality resulting from real or design storms for small watersheds generally limited to 2,000 acres or less. The principal model inputs are watershed area, land use characteristics, percent forested, percent impervious, and percent denuded. The input will also include either an observed hydrograph or an estimated Soil Conservation Service Curve Number (CN). The model is based upon 410 storms in 36 watersheds. Output is both tabular and graphical and provides the watershed hydrograph, pollutograph, and discussion of model assumptions. This report provides a background of the model, batch user instructions for CDC 6600 computers, and two example problems. The complete software package is provided in the Appendix. GRA

N81-14381# George Washington Univ., Washington, D.C. Dept. of Electrical Engineering and Computer Science.
ANALYSIS AND DEVELOPMENT OF IMAGE STATISTICS AND REDUNDANCY REMOVAL Final Report, 15 Sep. 1979 - 14 Sep. 1980
Murray H. Loew, Raymond L. Pickholtz, Lee Goldman, Fred Hill, and Fred Lawler Sep. 1980 162 p refs
(Contract DAAK70-79-C-0147)
(AD-A091600; GWU-EE-CS-80-09) Avail: NTIS
HC A08/MF A01 CSCL 09/2

The goal of classifying objects of cartographic interest in aerial photographs was approached using techniques from pattern recognition and image processing. Bridge and airport images were chosen as the initial objects of interest and segments of photographs containing them were digitized for the data base. Edge-detection and Hough transform algorithms identified structures as candidate bridges; additional decision logic (using global contrast and other attributes) further reduced the set. Results indicate the feasibility and low computational cost of the approach. Additional results in discrete medial-axis transformation are presented, as are methods for encoding the two kinds of images. The characteristics of the two kinds of targets are so distinctive that encoding promises substantial efficiencies. GRA

N81-14382# SRI International Corp., Menlo Park, Calif. Atmospheric Science Center.
LIDAR OBSERVATIONS AT 0.7 MICROMETERS AND 10.6 MICROMETERS WAVELENGTHS DURING SMOKE WEEK 2 Final Report, 11 Oct. 1976 - 10 Oct. 1980
Edward E. Uthe Oct. 1980 88 p refs
(Contract DAAG29-77-C-0001; SRI Proj. 5862)
(AD-A091561; ARO-13833.5-GS) Avail: NTIS
HC A05/MF A01 CSCL 17/8

A 10.6 micrometer wavelength lidar and a 0.7 micrometer wavelength lidar (Mark 4) were operated to observe smoke and dust clouds. The lidars observed cloud backscatter along horizontal parts that were nearly coincident with those observed by visible and infrared transmissometers operated by the Dugway Proving Ground. The lidar observed paths were terminated with a passive reflector so that time-dependent transmission over the lidar-to-target path could be evaluated from lidar observed target returns. Backscatter signatures for both lidars were digitized and recorded on magnetic tape using the Mark 4 lidar data processing system. Recorded lidar data were used to generate intensity-modulated TV displays depicting cloud structure along lidar observed paths as a function of time. These displays were used to choose sixteen Smoke Week 2 trials for quantitative analysis in terms of cloud attenuation and path-integrated backscattering. GRA

N81-14383# Naval Research Lab., Washington, D. C.
SEASAT ALTIMETER ATMOSPHERIC RANGE CORRECTION Final Report
James P. Hollinger 25 Sep. 1980 27 p refs
(AFOSR MIPR-HM0050-651; WR59553000)
(AD-A091504; NRL-MR-4342) Avail: NTIS
HC A03/MF A01 CSCL 20/14

This report describes the development and validation of the

wet term of the atmospheric range correction for the SEASAT altimeter by the Naval Research Laboratory as part of its contribution to the WAFER 82 Sub-Working Group on Acquisition and Exploitation of SEASAT Altimeter Data. The algorithm uses antenna temperatures from the SEASAT Scanning Multichannel Microwave Radiometer (SMMR). It was developed by Macmillian M. Wisler at NRL using an optimal linear estimator, a theoretical-empirical atmospheric-ocean model and a statistical description of the environment. The algorithm tests were performed by the JPL SMMR Evaluation Task Group by comparing the range correction derived from the algorithm with the range correction calculated using radiosonde water vapor measurements from the islands of Bermuda and Kwajalein. The data used for the comparison were taken from eight different orbits during 13-30 September 1978. The wet term range correction varied from 19 to 42 centimeters. Apart from a relatively unimportant systematic bias, which is easily and accurately removed, the algorithm and radiosonde range corrections agreed very well with an RMS deviation of + or - 2.0 centimeters. Improved calibration and antenna pattern corrections of SMMR data and greater radiometric accuracy of future passive microwave systems along with further algorithm development undoubtedly will allow improved accuracy in determination of the range correction.GRA

N81-14384# California Univ., Davis. Water Resources Center.

CALIFORNIA WATER RESOURCES CENTER: CHRONICLE OF RESEARCH, 1957-1980

J. Herbert Snyder Jun. 1980 157 p refs Sponsored by Office of Water Research and Technology

(PB80-222276; W80-06453; OWRT-A-999-CAL(16); ISSN-0575-4968; REPT-48) Avail:NTIS HC A08/MF A01 CSCL 13B

The projects are grouped according to the research program categories of the Center. A short statement introduces each category and describes the nature of the research work. GRA

N81-14385# Wisconsin Univ. - Milwaukee. Center for Great Lakes Studies.

DETERMINATION OF ATMOSPHERIC PHOSPHOROUS ADDITION TO LAKE MICHIGAN Final Report

S. J. Eisenreich, P. J. Emmling, and A. M. Beeton Jul. 1980 63 p refs

(Grant EPA-R-803238)

(PB80-219124; EPA-600/3-80-063) Avail: NTIS HC A04/MF A01 CSCL 08H

Bulk precipitation was collected on a monthly basis in the Lake Michigan basin for 18 months during 1975-1976 to determine atmospheric P loadings to Lake Michigan. The sampling network consisted of bulk collectors at 23 land stations and 2 in lake buoys located off urban and rural areas. Annual TP loading to Lake Michigan for 1976 based on loading rates of 0.184 and 0.303 micrograms/sq cm/mo for the north and south basins, respectively was 1.69 x 10 to the 6th power kb/year, representing approx. 16 percent of the total P budget. North and south basins showed different TP loading properties with approx. 62 percent depositing in the south basin. Seasonal variations in loading rates showed maxima in late spring and early summer, and minima in winter. GRA

N81-14386# Applied Physics Lab., Johns Hopkins Univ., Laurel, Md.

GEOTHERMAL ENERGY DEVELOPMENT IN THE EASTERN UNITED STATES: EVALUATION OF POTENTIAL GEOTHERMAL RESOURCE AREAS

Franklin O. Mitchell Jul. 1980 53 p refs Revised

(Contracts EX-76-A-36-1008; DE-AL01-79ET-27025)

(PB80-212806; APL/JHU/QM-79-163R/GT-Rev) Avail: NTIS HC A04/MF A01 CSCL 08I

A method for the comparative evaluation of geothermal prospects in the eastern United States is proposed and illustrated. Comparisons are based on quantified data from geologic, engineering, and socioeconomic sources including temperature gradient, depth to basement, drilling costs, population, and distribution by town size, as well as energy use in residential, commercial, and industrial applications. This revision incorporates new data for Mississippi and Pennsylvania. GRA

N81-14387# National Oceanic and Atmospheric Administration, Ann Arbor, Mich. Great Lakes Environmental Research Lab.

COMPUTERIZED BATHYMETRY AND SHORELINES OF THE GREAT LAKES

David J. Schwab and Diana L. Sellers Mar. 1980 18 p refs (PB80-218308; NOAA-DR-ERL-GLERL-16; NOAA-80071705) Avail: NTIS HC A02/MF A01 CSCL 08H

Bathymetric grid data and digitized shorelines compiled for the five Great Lakes and Lake St. Clair are presented. The bathymetric grids consist of an array containing the average lake depths in 2km squares (1.2km squares for Lake St. Clair). The digitized shorelines are lists of latitudes and longitudes for closed loops describing lake and island shorelines. Conversion equations for map-to-geographical and geographical-to-map coordinate transformations are given for all the bathymetric grids. GRA

N81-14388*# New Mexico Univ., Albuquerque. Technology Application Center.

REMOTE SENSING APPLIED TO POLLUTION MONITORING. CITATIONS FROM THE INTERNATIONAL AEROSPACE ABSTRACTS DATA BASE Progress Report, 1976 - Jun. 1980

Gerald F. Zollars Jun. 1980 61 p Supersedes NTIS/PS-79/0732 Sponsored by NASA and NTIS

(NASA-CR-163830; PB80-815632; NTIS/PS-79/0732) Avail: NTIS HC $30.00/MF $30.00 CSCL 13B

Citations from the international literature describe the use of remote sensors to aid in the monitoring of air and water pollution. Use of lasers, optical radar systems, aerial photography, and satellite observations are included. GRA

N81-14152*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.

A MULTIFREQUENCY EVALUATION OF ACTIVE AND PASSIVE MICROWAVE SENSORS FOR OIL SPILL DETECTION AND ASSESSMENT

Richard G. Fenner, Stephen C. Reid, and Charles H. Solie *In its* The 11th Space Simulation Conf. 1980 p 163-187 refs Prepared in cooperation with Lockheed Engineering and Management Services Co., Inc., Houston, Tex. (For primary document see N81-14138 05-31)

Avail: NTIS HC A19/MF A01 CSCL 14B

44 ENERGY PRODUCTION AND CONVERSION

Includes specific energy conversion systems, e.g., fuel cells and batteries; global sources of energy; fossil fuels; geophysical conversion; hydroelectric power; and wind power.

For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *85 Urban Technology and Transportation.*

N81-14389* National Aeronautics and Space Administration. Pasadena Office, Calif.

METHOD AND APPARATUS FOR FABRICATING IMPROVED SOLAR CELL MODULES Patent

Joseph T. Bloch (Boeing Aerospace Co., Seattle, Wash.), Randolph T. Hanger (Boeing Aerospace Co., Seattle, Wash.), and Frank W. Nichols, inventors (to NASA) (Boeing Aerospace Co., Seattle, Wash.) Issued 2 Sep. 1980 6 p Filed 23 Feb. 1979 Supersedes N79-18446 (17 - 09, p 1156) Sponsored by NASA

(NASA-Case-NPO-14416-1; US-Patent-4,219,926; US-Patent-Appl-Sn-014664; US-Patent-Class-29-832; US-Patent-Class-29-DIG.1) Avail: US Patent and Trademark Office CSCL 10A

A method and apparatus for fabricating an improved solar cell module is described. The apparatus includes a supply drum for feeding a flexible strip having etched electrical circuitry deposited on it a supply drum for feeding into overlying engagement with the flexible strip a flexible tape having a pair of exposed tacky surfaces, and a plurality of rams for receiving

and depositing a plurality of solar cells in side-by-side relation on an exposed tacky surface of the tape in electrical contacting engagement with the etched circuitry.

Official Gazette of the U.S. Patent and Trademark Office

N81-14390# Committee on Science and Technology (U. S. House).

FORESIGHT. VOLUME 3: THE ECONOMIC IMPACT OF ENERGY CONSERVATION

Alvin Kaufman and Susan J. Bodilly, ed. Washington GPO 1979 499 p refs Proc. of an Eng. Found. Conf., Henniker, N.H., 23-28 Jul. 1978 Presented to the Subcomm. on Advan. Energy Technol. and Energy Conserv. Res., Develop. and Demonstration of the Comm. on Sci. and Technol., 95th Congr., 2nd Sess., Dec. 1978 Prepared by the Congressional Research Service, Library of Congress

(GPO-41-483) Avail: SOD HC

Various economic ramifications of energy conservation are discussed. The impact of conservation of various major sections of the economy are considered. L.F.M.

N81-14391*# Motorola, Inc., Phoenix, Ariz.

MARKET DEFINITION STUDY OF PHOTOVOLTAIC POWER FOR REMOTE VILLAGES IN DEVELOPING COUNTRIES

Clyde Ragsdale and Prosper Quashie Oct. 1980 208 p refs (Contracts DEN3-49; DE-A101-79ET-20485)

(NASA-CR-159880; DOE/NASA/0049-80/2; EDR-1110) Avail: NTIS HC A10/MF A01 CSCL 10B

The potential market of photovoltaic systems in remote village applications in developing countries is assessed. It is indicated that photovoltaic technology is cost-competitive with diesel generators in many remote village applications. The major barriers to development of this market are the limited financial resources on the part of developing countries, and lack of awareness of photovoltaics as a viable option in rural electrification. A comprehensive information, education and demonstration program should be established as soon as possible to convince the potential customer countries and the various financial institutions of the viability of photovoltaics as an electricity option for developing countries. J.M.S.

N81-14392*# Tennessee Univ., Knoxville. Systems and Radar Lab.

SATELLITE POWER SYSTEM (SPS) ANTENNA POINTING CONTROL Final Report

Washington, D.C. Nov. 1980 86 p refs

(Contract NAS8-33604)

(NASA-CR-3350; M-317) Avail: NTIS HC A05/MF A01 CSCL 10A

Accuracy requirements for the SPS antenna pointing control consists of a mechanical pointing accuracy of three arc minutes and an electronic phased array pointing accuracy of three arc seconds. Results of this study, based on the factors considered in current analysis, show that the three arc minute overall pointing control accuracy can be achieved for the SPS in practice. E.D.K.

N81-14393*# Kaw Valley State Bank and Trust Co., Topeka, Kans.

SOLAR HEATING, COOLING, AND DOMESTIC HOT WATER SYSTEM INSTALLED AT KAW VALLEY STATE BANK AND TRUST COMPANY, TOPEKA, KANSAS Final Report

Nov. 1980 184 p Sponsored by NASA

(Contract EG-77-A-01-4030)

(NASA-CR-161595) Avail: NTIS HC A09/MF A01 CSCL 10B

The building has approximately 5600 square feet of conditioned space. Solar energy was used for space heating, space cooling, and preheating domestic hot water (DHW). The solar energy system had an array of evacuated tube-type collectors with an area of 1068 square feet. A 50/50 solution of ethylene glycol and water was the transfer medium that delivered solar energy to a tube-in-shell heat exchanger that in turn delivered solar heated water to a 1100 gallon pressurized hot water storage tank. When solar energy was insufficient to satisfy the space heating and/or cooling demand, a natural gas-fired boiler provided auxiliary energy to the fan coil loops and/or the absorption chillers. Extracts from the site files, specification references, drawings, and installation, operation and maintenance instructions are presented. Author

N81-14394*# Columbia Gas Corp., Ohio.

SOLAR HEATING, COOLING AND DOMESTIC HOT WATER SYSTEM INSTALLED AT COLUMBIA GAS SYSTEM SERVICE CORPORATION, COLUMBUS, OHIO Final Report

Nov. 1980 123 p Sponsored by NASA

(Contract EG-77-A-01-4089)

(NASA-CR-161603; AH-45376) Avail: NTIS HC A06/MF A01 CSCL 10B

The solar energy system installed in the building has 2,978 sq ft of single axis tracking, concentrating collectors and provides solar energy for space heating, space cooling and domestic hot water. A 1,200,000 Btu/hour water tube gas boiler provides hot water for space heating. Space cooling is provided by a 100 ton hot water fired absorption chiller. Domestic hot water heating is provided by a 50 gallon natural gas domestic storage water heater. Extracts from the site files, specification references, drawings, installation, operation and maintenance instructions are included. A.R.H.

N81-14395*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.

CONTROL AND DYNAMICS STUDY FOR THE SATELLITE POWER SYSTEM. VOLUME 1: MPTS/SPS COLLECTOR DYNAMIC ANALYSIS AND SURFACE DEFORMATION

S. J. Wang 1 Sep. 1980 113 p refs Prepared for JPL

(Contract NAS7-100)

(NASA-CR-163826; JPL-Pub-80-77-Vol-1) Avail: NTIS HC A06/MF A01 CSCL 10A

The basic dynamic properties and performance characteristics of the microwave power transmission satellite antenna were analyzed in an effort to develop criteria, requirements, and constraints for the control and structure design. The vibrational properties, the surface deformation, and the corresponding scan loss under the influence of disturbances are considered. A.R.H.

N81-14396*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

CATALYTIC COMBUSTION OF COAL-DERIVED LIQUIDS

Daniel L. Bulzan and Robert R. Tacina 1981 25 p refs Presented at 26th Ann. Intern. Gas Turbine Conf., Houston, Tex., 8-12 Mar. 1981; sponsored by ASME

(Contract DE-AI01-77ET-10350)

(NASA-TM-81594; E-661; DOE/NASA/10350-21) Avail: NTIS HC A02/MF A01 CSCL 10B

A noble metal catalytic reactor was tested with three grades of SRC 2 coal derived liquids, naphtha, middle distillate, and a blend of three parts middle distillate to one part heavy distillate. A petroleum derived number 2 diesel fuel was also tested to provide a direct comparison. The catalytic reactor was tested at inlet temperatures from 600 to 800 K, reference velocities from 10 to 20 m/s, lean fuel air ratios, and a pressure of 3 x 10 to the 5th power Pa. Compared to the diesel, the naphtha gave slightly better combustion efficiency, the middle distillate was almost identical, and the middle heavy blend was slightly poorer. The coal derived liquid fuels contained from 0.58 to 0.95 percent nitrogen by weight. Conversion of fuel nitrogen to NOx was approximately 75 percent for all three grades of the coal derived liquids. Author

N81-14397*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

APPLICABILITY OF ADVANCED AUTOMOTIVE HEAT ENGINES TO SOLAR THERMAL POWER

Donald G. Beremand, David G. Evans, and Donald L. Alger 1981 26 p refs Presented at SAE Intern. Eng. Congr. and Exposition, Detroit, 23-27 Feb. 1981

(Contract EX-76-A-29-1060)

(NASA-TM-81658; E-675; DOE/NASA/1060-4) Avail: NTIS HC A03/MF A01 CSCL 10B

The requirements of a solar thermal power system are reviewed and compared with the predicted characteristics of automobile engines under development. A good match is found in terms of power level and efficiency when the automobile engines, designed for maximum powers of 65-100 kW (87 to

133 hp) are operated to the nominal 20-40 kW electric output requirement of the solar thermal application. At these reduced power levels it appears that the automotive gas turbine and Stirling engines have the potential to deliver the 40+ percent efficiency goal of the solar thermal program. M.G.

N81-14398*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

ULTRA-LEAN COMBUSTION AT HIGH INLET TEMPERATURES

David N. Anderson 1981 20 p refs Presented at 26th *Intern. Gas Turbine Conf., Houston, Tex., 8-21 Mar. 1981;* sponsored by ASME

(Contract EC-77-A-31-1101)

(NASA-TM-81640; E-677; DOE/NASA/1011-33) Avail: NTIS HC A02/MF A01 CSCL 21B

Combustion at inlet air temperatures of 1100 to 1250 K was studied for application to advanced automotive gas turbine engines. Combustion was initiated by the hot environment, and therefore no external ignition source was used. Combustion was stabilized without a flameholder. The tests were performed in a 12 cm diameter test section at a pressure of 2.5 x 10 to the 5th power Pa, with reference velocities of 32 to 60 m/sec and at maximum combustion temperatures of 1350 to 1850 K. Number 2 diesel fuel was injected by means of a multiple source fuel injector. Unburned hydrocarbons emissions were negligible for all test conditions. Nitrogen oxides emissions were less than 1.9 g NO2/kg fuel for combustion temperatures below 1680 K. Carbon monoxide emissions were less than 16 g CO/kg fuel for combustion temperatures greater than 1600 K, inlet air temperatures higher than 1150 K, and residence times greater than 4.3 microseconds. Author

N81-14399*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

EFFECT OF FUEL NITROGEN AND HYDROGEN CONTENT ON EMISSIONS IN HYDROCARBON COMBUSTION

David A. Bittker and Gary Wolfbrandt 1981 24 p refs Presented at 26th Ann. Intern. Gas Turbine Conf., Houston, Tex. 8-12 Mar. 1981; sponsored by ASME

(Contract DE-AI01-77ET-10350)

(NASA-TM-81612; E-614; DOE/NASA-10350-19) Avail: NTIS HC A02/MF A01 CSCL 10B

How the emissions of nitrogen oxides and carbon monoxide are affected by: (1) the decreased hydrogen content and (2) the increased organic nitrogen content of coal derived fuels is investigated. Previous CRT experimental work in a two stage flame tube has shown the effectiveness of rich lean two stage combustion in reducing fuel nitrogen conversion to nitrogen oxides. Previous theoretical work gave preliminary indications that emissions trends from the flame tube experiment could be predicted by a two stage, well stirred reactor combustor model using a detailed chemical mechanism for propane oxidation and nitrogen oxide formation. Additional computations are reported and comparisons with experimental results for two additional fuels and a wide range of operating conditions are given. Fuels used in the modeling are pure propane, a propane toluene mixture and pure toluene. These give hydrogen contents 18, 11 and 9 percent by weight, respectively. Fuel bound nitrogen contents of 0.5 and 1.0 percent were used. Results are presented for oxides of nitrogen and also carbon monoxide concentrations as a function of primary equivalence ratio, hydrogen content and fuel bound nitrogen content. Author

N81-14400# AEG-Telefunken, Wedel (West Germany). Fachbereich Raumfahrt, Neue Technologien.

DESIGN AND FABRICATION OF TERRESTRIAL, PHOTOVOLTAIC SOLAR GENERATORS FOR FIELD TESTING IN REGIONS OF INTENSIVE INSOLATION Final Report

Hans-Dieter Wegmann Bonn Bundesministerium fuer Forschung und Technologie Oct. 1979 36 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie

(BMFT-FB-T-79-34; ISSN-0340-7608) Avail: NTIS HC A03/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 7,15

Two types of solar generators developed: encapsulation of interconnected 5 x 5 cm silicon solar cells in glass or in glass fiber reinforced acrylic resin. To obtain information about lifetimes and long term characteristics of solar generators, it was necessary to get practical experience from field testing and countries with intensive insolation were chosen as test sites. Test results from field testing contribute to an optimum design of future prototype fabrication equipment. Three solar generators were delivered: one research generator for the University of Teheran, Iran, one generator for supply of a transmitter station of the Iranian Post Office, and one generator for supply of a navigation buoy in the Red Sea. Some solar generator modules remained in Wedel for testing and as reference samples. Author

N81-14401# Brown, Boveri und Cie, A.G., Heidelberg (West Germany). *Zentrales Forschungslabor.*

PASSIVATION OF SILICON POWER DEVICES BY THERMAL OXIDATION Final Report

Arno Neidig, George Wahl, Klaus Weimann, and Gabriele Gilbers Bonn Bundesministerium fuer Forschung und Technologie Dec. 1979 77 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie

(BMFT-FB-T-79-48; ISSN-0340-7608) Avail: NTIS HC A05/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 16

A method was developed for the passivation of high voltage silicon power devices replacing the usually applied sensitive silicon polymers on the edge beveling of the pn junctions. The new passivation is produced at temperatures between 600 C and 900 C by thermal oxidation followed by chemical vapor deposition of a barrier layer against alkaline impurities. The barrier layers are Si3N4 and Al2O3 respectively. Stable blocking properties were obtained with high voltage devices for long periods of time. The passivation coating opens the way for high voltage power devices packed in low cost cases instead of the expensive hermetically sealed ceramic cases. Author

N81-14402# Friedrichsfeld G.m.b.H., Mannheim (West Germany). *Steinzeug- und Kunststoffwerke.*

PRODUCTION TECHNOLOGY OF BETA-ALUMINA CERAMICS FOR Na/S BATTERIES Final Report

Guenter Heimke and Gerd Willmann Bonn Bundesministerium fuer Forschung und Technologie Dec. 1979 117 p refs In GERMAN; ENGLISH summary Sponsored by *Bundesministerium fuer Forschung und Technologie*

(BMFT-FB-T-79-57; ISSN-0340-7608) Avail: NTIS HC A06/MF A01; *Fachinformationszentrum, Karlsruhe, West Germany DM 24,15*

The development of the fabrication processes to produce tubes of beta-alumina ceramics for the Na/S-battery was made on the basis of the results in 1974 and in close cooperation with the Research Center of BBC in Heidelberg. The selection of raw materials, the handling of the beta-alumina powders and the shaping were clarified, except the parameters for spray drying. The results of firing in an tunnel kiln, with high pushing rates showed that the beta-alumina tubes could be produced with sufficient density, microstructure and chemical composition in a way that is transferable to a real production. Nevertheless there is the problem to reduce the consumption of the kiln furniture. It is possible to calculate the costs for producing beta-alumina tubes assuming the production of a large number of tubes and assuming that the problem of the kiln furniture is solved. Author

N81-14403# *Kernforschungsanlage, Juelich (West Germany).*

ENERGY ANALYSIS OF SOLAR ENERGY SYSTEMS, HEAT PUMPS AND OF IMPROVED INSULATION OF SINGLE FAMILY HOUSES Final Report

Hermann Josef Wagner and Roland Turowski Bonn Bundesministerium fuer Forschung und Technologie Dec. 1979 31 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie

(BMFT-FB-T-79-101; ISSN-0340-7608) Avail: NTIS HC A03/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 6,30

In the evaluation criteria such as economic competitiveness, environmental impact and ease of use were taken into account along with the energy economy of a system. This criterion compares the energy output of a system with the energy required for its installation and operation. The methods of the process chain analysis and the systematics of input-output tables permit

the evaluation of the net energy production. It was found that the energy amortization period for insulation improvement (ca. 2 months), for heat pump systems (5-14 months) and for solar systems (16-23 months) are much shorter than the anticipated life expectancy of the systems. From the point of view of energy economy it follows that even with accelerated market introduction there is no restriction for the market introduction rate. T.M.

N81-14404# AEG-Telefunken, Frankfurt am Main (West Germany). Dept. of Material Sciences.

DEVELOPMENT OF A CRUDE GAS/AIR FUEL CELL SYSTEM Final Report

Harald Boehm, Robert Fleischmann, and Joachim Heffler Bonn Bundesministerium fuer Forschung und Technologie Dec. 1979 40 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie

(BMFT-FB-T-79-103; ISSN-0340-7608) Avail: NTIS HC A03/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 8,40

A matrix type fuel cell with WC anode and Pt cathode was developed operating at 150 C with concentrated phosphoric acid as the electrolyte. Batteries with 5 and 40 cells were stacked to ether delivering an output up to 8 W/cell under H2/air. No decay in the power density was observed in long term tests over more than 5000 hours. These tests also showed no problems in the water balance of the batteries and proved a maintenance free operation of the stacks. Author

N81-14405# IEA Coal Research, London (England).

CONVERSION TO COAL AND COAL/OIL FIRING

G. F. Morrison Dec. 1979 70 p refs

(ICTS/TR-07; ISBN-92-9029-047-1) Avail: NTIS HC A04/MF A01

The literature on the conversion of power stations currently burning fuel oil or natural gas to coal or coal oil mixtures (COM) is reviewed. The influence of fuel type on power station design is discussed. It is concluded that only boilers designed originally for coal, but currently burning an alternate fuel, can be retrofitted to burn coal. Not all such boilers can be converted as sufficient space for coal handling and storage equipment may no longer be available. COM can be burned in the majority of boilers designed for coal or oil firing with only minor modifications to combustion equipment. Thus, COM provides a short term means of increasing the use of coal for power generation. The history of COM combustion and current research programs are discussed. Particular attention is given to COM stability, equipment design and atmospheric emissions from COM combustion. References are given within the text to substantiate facts, to indicate further relevant published material and to give an indication of people and organizations with particular interests in specific fields of fuel substitution. Author

N81-14406# Centro Informazioni Studi Esperienze, Milan (Italy). CISE Documentation Service.

THE RETE PROJECT. INTEGRATED PUBLIC AND PRIVATE COGENERATION

P. Alia, F. Dallavalle, C. DeNard, M. Genova, G. Salimbeni (Aerimpianti, Milan), G. Spagni (Azienda Gas Acqua Consorziale, Reggio Emilia, Italy), and S. Veneziani (Azienda Gas Acqua Consorziale, Reggio Emilia, Italy) Nov. 1979 63 p refs Presented at 2nd Intern. Total Energy Congr., Copenhagen, 8-12 Oct. 1979

(CISE-1527) Avail: NTIS HC A04/MF A01

The results of the technical and economic feasibility study done for a total energy plant to be built for the San Pellegrino neighborhood in Reggio Emilia are given. Once the energy requirements (thermal and electric) of the users was established, the kind of plant to be used was selected and some hourly energy analyses were done for such a plant to determine the best kind of operation. On the basis of economic considerations, too, the kind of operation proposed is 'mixed', that is, compulsory electrical for the winter season and compulsory thermal for the remaining months of the year. Under these operating conditions the plant realizes about a 38% annual saving of primary fuel (in comparison to a conventional system satisfying the same energy demand) with a profit of about 8% (recovery time 12 to 13 years). A larger number of users would make it possible to increase profitability to something around 10% (recovery time ten years). Author

N81-14407# Messerschmitt-Boelkow-Blohm G.m.b.H., Ottobrunn (West Germany). Space Div.

DEVELOPMENT AND PREPARATION OF INDUSTRIAL SCALE MANUFACTURING PROCESSES FOR A MODULAR SOLAR-ASSISTED HOUSE-HEATING-SYSTEM, PHASE 2B Final Report

Ruediger Elchlepp Bonn Bundesministerium fuer Forschung und Technologie Dec. 1979 60 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie

(BMFT-FB-T-79-85; ISSN-0340-7608) Avail: NTIS HC A04/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 12,60

Thermodynamic measurements were performed with solar experimental systems which were integrated into solar experimental houses at Hohenkirchen and Otterfing. All essential qualitative and quantitative test results up to the end of 1977 are summarized. Discussion of test results and conclusions are included. T.M.

N81-14408# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Goettingen (West Germany). Abt. Elastomechanik und Aeroelastische Stabilitaet.

A GENERAL CALCULATION METHOD FOR THE DYNAMIC RESPONSE TO DISCRETE GUST DISTRIBUTIONS AS EXEMPLIFIED BY THE ROTORBLADE OF A WIND ENERGY CONVERTER

Dieter Ludwig Mar. 1980 63 p refs In GERMAN; ENGLISH summary Report will also be announced as translation (ESA-TT-684)

(DFVLR-FB-80-12) Avail: NTIS HC A04/MF A01; DFVLR, Cologne DM 13,60

An analytical method to calculate the dynamic response of elastic structure to discrete gust distributions is presented. The formulation is based on the assumption that the modal parameters of the structure are known and can be received by eigenanalysis or gound vibration test. No restriction is made concerning the number of flapwise bending modes nor the distribution of discrete gusts. The generalized forces due to excitation and due to motion are approximated by means of the known exponential forms of Wagner's function and Kussner's function to get an analytical solution in the shortest possible computing time. E.D.K.

N81-14409# Mound Lab., Miamisburg, Ohio.

SALT-GRADIENT SOLAR PONDS: DESIGN, CONSTRUCTION AND POWER PRODUCTION

Layton J. Wittenberg 1980 19 p refs Presented at the Intern. Symp. on Solar Energy Util., London, Ontario, 10-24 Aug. 1980

(Contract DE-AC04-76DP-00053)

(MLM-2770(OP); CONF-800871-1) Avail: NTIS HC A02/MF A01

Salt gradient solar ponds are combined solar energy collectors and thermal storage systems. The ponds are made nonconvective by the formation of a density gradient composed of salt solutions whose concentrations increase with depth. The depth of the various layers of the pond determine the efficiency and thermal storage capacity of the system. The construction of the largest such pond in the US, 2000 sq m was completed for approximately $35/sq m. The pond is estimated to produce 1015 GJ/y of low temperature heat at a cost of $8.95/GJ, when the installation costs are amortized over, 15/y. Construction changes are suggested to improve the reliability of the system. DOE

N81-14410# Sandia Labs., Albuquerque, N. Mex. Fluid Mechanics and Heat Transfer Div.

ANNULAR SOLAR RECEIVER THERMAL CHARACTERISTICS

Arthur C. Ratzel and Carl E. Sisson Oct. 1980 80 p refs Sponsored by DOE

(SAND-79-1010) Avail: NTIS HC A05/MF A01

Results from thermal studies performed for an annular solar receiver assembly to be used with the 2 m, 90 deg parabolic collector trough are presented. The receiver configuration modeled consists of a 2.54 cm o.d. steel tube with a black chrome

selective surface and an enclosing concentric Pyrex glass envelope. Previous thermal work conducted on the parabolic cylindrical collector design established the geometry and solar noon absorbed flux distribution used. One and two dimensional thermal models were developed to provide receiver assembly temperatures, heat losses, and working fluid energy extraction data with the Therminol-66 (T-66) bulk temperature maintained at 315 C. Parameters varied in the work include wind velocity, ambient air temperature, annulus gas pressure, and T-66 flow condition (Reynolds number). Heat loss and energy extraction results are tabulated and temperature distributions from two dimensional thermal modeling are graphically presented. Author

N81-14411# Sandia Labs., Albuquerque, N. Mex. Component and Subsystem Development Div.

DEVELOPMENT OF SHEET MOLDING COMPOUND SOLAR COLLECTORS WITH MOLDED-IN SILVERED GLASS REFLECTIVE SURFACES

Roscoe L. Champion and Ronald E. Allred 1980 42 p refs Sponsored by DOE

(SAND-80-0702C; CONF-800686-1) Avail: NTIS HC A03/MF A01

The feasibility of molding glass mirrors into SMC structural trough panels was investigated. Results indicate that the sagged and annealed glass panels will not survive the pressure and temperature conditions (600-700 psi, 300 F) encountered in SMC molding. However, the chemically strengthened glass mirrors were elastically formed to the parabolic contour and were successfully molded as an integral part of the structure. The 4 x 2 ft parabolic panels consisted of a front sheet of silvered glass molded with a back face sheet of SMC plus peripheral ribs and internal ribs for structural stiffness. Ribs were successfully molded with no 'sink' evident on the reflective surface of the glass. The environmental capability of these panels appears to be excellent based on their response to accelerated thermal cycling tests. DOE

N81-14412# Sandia Labs., Albuquerque, N. Mex. Thermophysical Properties Div.

SOLAR MIRROR MATERIALS: THEIR PROPERTIES AND USES IN SOLAR CONCENTRATING COLLECTORS

R. B. Pettit and E. P. Roth Jun. 1980 43 p refs Submitted for publication Sponsored by DOD

(SAND-79-2190) Avail: NTIS HC A03/MF A01

Solar mirror materials are used in a variety of solar collectors. Applications range from augmented flat plate collectors to high concentration tracking parabolic dish concentrators. The advantage in using solar mirrors is either to increase the system efficiency (e.g., by reducing thermal losses) or to reduce the system cost where relatively expensive receiver materials are utilized (e.g., photovoltaic cells). In most applications, the total mirror surface area deployed is large; thus the mirrors must be manufactured at a low cost. Because of the variety of solar applications, the optical requirements of solar mirrors vary greatly. All applications are sensitive to the solar averaged reflectance properties, which should be as close to unity as possible. The requirements on the distribution of the reflected sunlight (defined as specularity) span a range from very diffuse to highly specular, depending upon the application. Optical characterization of solar mirrors should be consistent with the intended application. S.F.

N81-14413# Sandia Labs., Albuquerque, N. Mex. Exploratory Batteries Div.

ELECTROCHEMICAL AND SURFACE ANALYSIS OF THE REACTIVE INTERFACES IN THE Li (Si)/FeS2 PRIMARY BATTERY

Rod K. Quinn, Dale E. Zurawski, and Neal R. Armstrong (Arizona University, Tucson) 1980 28 p refs Presented at the Intern. Power Sources Symp., Brighton, England, 15-18 Sep. 1980

(Contract DE-AC04-76DP-00789)

(SAND-79-2155) Avail: NTIS HC A03/MF A01

Compositional changes in the anode, electrolyte, and cathode regions of the Li(Si)/LiCl KCl/FeS2 battery system were studied. The results of studies by scanning electron and photomicroscopy, electron microprobe analysis, and Auger electron spectroscopy of the anode/electrolyte-binder interface and the carbode/electrolyte-binder interface are presented. Analyses of single cell discharges, where current density, temperature, and time can be controlled, show significant migration of sulfur, iron, and silicon. This migration apparently results in a concentration of sulfur and iron in a well-defined, narrow region approximately in the center of the electrolyte. A mechanism for this observation is proposed. Author

N81-14414# Sandia Labs., Albuquerque, N. Mex. System Analysis Div.

SOLAR CENTRAL RECEIVER IN PERSPECTIVE

Theodore A. Dellin 1980 10 p ref Sponsored by DOE

(SAND-79-2154C; CONF-800604-35) Avail: NTIS HC A02/MF A01

The variation in the energy costs of solar control receiver systems as a function of power level, receiver geometry, heliostat size, and heliostat canting option are presented. The results were obtained using a new version of the DELSOL computer model. A broad minimum in the cost of thermal energy at the base of the tower is observed in systems with power levels from 10 MWt to net 1000 MWt. In addition, this power range can be served by a single heliostat design. Author

N81-14415# Sandia Labs., Albuquerque, N. Mex.

THE EFFECT OF SOILING ON SOLAR MIRRORS AND TECHNIQUES USED TO MAINTAIN HIGH REFLECTIVITY

E. P. Roth and R. B. Pettit Jun. 1980 52 p refs Submitted for publication

(Contract DE-AC04-76DP-00789)

(SAND-79-2422; DR-1609) Avail: NTIS HC A04/MF A01

Specular reflectance losses as great as 25 percent was observed for mirrors exposed for only a few weeks. The effect of the deposited particles is to reduce the reflected energy by both absorbing and scattering light. The degree to which the particles reduce the collection of reflected energy depends on their composition, number and size distribution. An additional factor is the optics of the collection system. The angular acceptance aperture of the system, defined as the angle subtended by the receiver at the concentrator surface, determines the relative importance of the scattering due to dust accumulation. A field study was initiated simulating some of the operational configurations of solar mirrors. T.M.

N81-14416# Westinghouse Research Labs., Pittsburgh, Pa.

REGIONAL CONCEPTUAL DESIGN AND ANALYSIS STUDIES FOR RESIDENTIAL PHOTOVOLTAIC SYSTEMS, VOLUME 2 Final Report

P. F. Pittman, E. F. Federmann, M. Brodzik, W. J. McAllister, R. W. Stoeltzing, S. Nearhoof, and P. R. Rittelmann May 1980 269 p refs Prepared for Sandia National Labs., Albuquerque, N. Mex.

(Contract DE-AC04-76DP-00789)

(SAND-78-7040/2) Avail: NTIS HC A12/MF A01

Solar residential photovoltaic energy systems suitable for incorporation into single family residences were studied. The country was subdivided into ten regions, and the three best systems for each region were determined from the many possible system configurations, based on assumed subsystem costs and performance. Cost projections based on high volume production indicate that solar total energy systems would be viable. If a sufficiently comprehensive government program is forthcoming, they can be economically advantageous in some areas within 10 years and almost everywhere in the country by 2000. The three best system configurations found indepenent of the specific sites are those with combined electrical/thermal modules, electrical-only modules with a heat pump, and possibly separate side-by-side electrical and thermal arrays. Order of preference is determined by the site/structure characteristics. Author

N81-14417# Sandia Labs., Albuquerque, N. Mex. Applied Mechanics Div.

TORQUE RIPPLE IN A DARRIEUS, VERTICAL AXIS WIND TURBINE

Robert C. Reuter, Jr. Sep. 1980 36 p refs Sponsored by DOE

(SAND-80-0475) Avail: NTIS HC A03/MF A01

Interaction between a steady wind and a rotating, Darrieus, vertical axis wind turbine produces time periodic aerodynamic loads which cause time dependent torque variations, referred to as torque ripple, to occur in the mechanical link between the

turbine and the electrical generator. There is concern for the effect of torque ripple upon fatigue life of drive train components and upon power quality. An analytical solution characterizing the phenomenon of torque ripple was obtained which is based upon a Fourier expansion of the time dependent features of the problem. Numerical results for torque ripple, some experimental data, determination of acceptable levels and methods of controlling it, are presented and discussed. Author

N81-14418# Martin Marietta Corp., Denver, Colo.
SOLAR CENTRAL RECEIVER HYBRID POWER SYSTEM, PHASE 1. VOLUME 3: APPENDICES Final Technical Report, Oct. 1978 - Aug. 1979
Sep. 1979 253 p
(Contract ET-78-C-03-2234)
(DOE/ET-21038/1-Vol-3) Avail: NTIS HC A12/MF A01

Parametric salt piping data, sample heat exchanger calculations, and salt/materials compatibility evaluations are presented. Data lists that include the heliostat field coordinates, the STEAEC program input data, the hybrid receiver design drawings and models, and the piping stress analysis are also presented. T.M.

N81-14419# Lockheed Missiles and Space Co., Palo Alto, Calif.
AMORPHOUS THIN FILMS FOR SOLAR CELL APPLICATION Quarterly Report, 1 Jul. - 30 Sep. 1979
A. D. Jonath, J. L. Crowley, H. F. MacMillan, W. W. Anderson, F. A. Junga, C. F. Kooi, T. K. McNab, W. R. Scoble, and J. A. Thornton Oct. 1979 42 p refs
(Contract DE-AC03-79ET-23040)
(DOE/ET-23040/2; LMSC-D678918: QR-2) Avail: NTIS HC A03/MF A01

Progress in film deposition, ion implantation, and film characterization is reported. High resistivity, low conductivity films were found to contain large amounts of oxygen. Film anneal and implantation anneal appear to be separable phenomena. Room temperature F(+) implantation into resistive a-Si:H films increases the conductivity by 4 to 5 orders of magnitude. Anneal to 400 C (1 atm Ar) does not appear to activate the F implant. Both F(+) and P(+) implantations tend to stabilize the photoconductivity activation energy as a function of anneal temperature up to 400 C. Cylindrical magnetron deposition was delayed because the cathode tube required transmutation doping in order to sputter in the dc mode. A thermally activated high conductivity film, sputter-deposited without hydrogen as reactive gas, was found to contain approximately 4% H as measured by the SiH mode appearance in the Raman spectra. Some oxygen inclusion is also suspected; water vapor is considered to be the source. A.R.H.

N81-14420# Exxon Research and Engineering Co., Linden, N.J. Advanced Energy Systems Labs.
THIN FILM POLYCRYSTALLINE SILICON SOLAR CELLS Final Report, 1 Jan. - 31 Dec. 1979
Amal K. Ghosh, Tom Feng, and H. Paul Maruska 1979 108 p refs
(Contract DE-AC03-79ET-23047)
(DOE/ET-23047/4) Avail: NTIS HC A06/MF A01

A theory of the electrical and photovoltaic properties of polycrystalline silicon is presented. It is shown that grain boundary states play a dominant role is determining these properties of silicon. Since the grain boundary area is proportional to the grain size, it is possible to relate these properties to grain sizes. Results show that improvements in device performance can be achieved either by increasing the grain size or passivating the grain boundary states to reduce the number of recombination centers. Details of the fabrication procedures for making silicon solar cells are included. L.F.M.

N81-14421# Department of Energy, Washington, D. C. Energy Information Administration.
UNDERGROUND NATURAL GAS STORAGE IN THE UNITED STATES 1979 - 1980 HEATING YEAR Progress Report, Apr. 1979 - Mar. 1980
Sep. 1980 27 p
(DOE/EIA-0239/79) Avail: NTIS HC A03/MF A01

Total gas in storage in the nation's active underground natural gas storage reservoirs as of March 31, 1980, the end of the 1979-1980 heating year, was reported at 5,129 billion cubic feet. Of this total, approximately 69.1 percent was base, or cushion, gas and 30.9 percent was working gas. Working gas totaled 1,586 billion cubic feet, approximately 28.2 percent above that available at the beginning of the heating year. The nation's 383 active storage reservoirs were operated by 77 companies. Total reservoir capacity was reported at 7,287 billion cubic feet, approximately 51.4 percent, or 3,744 billion cubic feet ofwhich was working gas capacity. Approximately 67.9 percent of this working gas capacity was in 228 reservoirs operated by 30 interstate pipeline companies, 29.1 percent was in 142 reservoirs operated by 42 intrastate companies, and 3.1 percent was in 13 reservoirs operated by 5 independent producers. A.R.H.

N81-14422# Boeing Computer Services, Inc., Seattle, Wash.
DEVELOPING AND UPGRADING OF SOLAR SYSTEM THERMAL ENERGY STORAGE SIMULATION MODELS Technical Progress Report, 1 Mar. 1979 - 29 Feb. 1980
J. K. Kuhn, G. F. vonFuchs, and A. P. Zob May 1980 194 p refs
(Contract DE-AC02-77CS-34482)
(DOE/CS-34482/4) Avail: NTIS HC A09/MF A01

Work performed on a three year project entitled Developing and Upgrading of Solar Systems Thermal Energy Storage (TES) Simulation Models is discussed. Objectives include: (1) collect, standardize, and link existing TES models from the literature and other contractors; (2) correlate TES models with available TES component data; (3) develop streamlined versions of validated TES component models; (4) provide a competent solar TES simulation tool. S.F.

N81-14423# Department of Energy, Washington, D. C. Energy Information Administration.
ENERGY POLICY STUDY. VOLUME 10: NUCLEAR POWER REGULATION
Z. D. Hikodam 1980 259 p refs
(DOE/EIA-0201/10) Avail: NTIS HC A12/MF A01

Federal and State regulatory procedures are described. The legal foundations for the Federal licensing process and the associated State activities are also described. The aspects of these procedures that affect the cost and supply of nuclear generated electricity were analyzed. The effects of nuclear safety regulations on the planning and construction lead time for nuclear power stations, the cost of nuclear power, and the decision to invest in nuclear power were investigated. T.M.

N81-14424# Department of Energy, Washington, D. C. Energy Information Administration.
ENERGY INFORMATION REFERRAL DIRECTORY, SECOND QUARTER 1980
1980 161 p
(DOE/EIA-0205/80-2Q) Avail: NTIS HC A08/MF A01

The Directory, which includes organizational charts and an index of building locations, summarizes information and referral services for the following: business and labor affairs; consumer affairs; education affairs; international affairs; public affairs; information services; energy information; energy policy and legislation; regulation; energy conservation; environment; coal; petroleum; natural gas; electric power; renewable energy sources; oil shale. S.F.

N81-14425# Georgia Univ., Athens. Dept. of Microbiology.
A MULTIDISCIPLINARY RESEARCH PROGRAM DIRECTED TOWARD UTILIZATION OF SOLAR ENERGY THROUGH BIOCONVERSION OF RENEWABLE RESOURCES Final Report
W. R. Finnerty Jul. 1980 128 p refs
(Contract DE-AS09-76ER-00888)
(DOE/ER-00888/3) Avail: NTIS HC A07/MF A01

Cellulytic bacteria, cellobiose fermentors, sulfate-reducing bacteria and methanogenic bacteria were isolated from established anaerobic mesophilic and thermophilic cellulose methane fermentations and these isolates, plus known laboratory strains, were employed to partially reconstitute highly active cellulose fermentations. These mixed cultures are utilized as model systems to study the parameters required for maximum production of CH4, H2 and chemical feedstocks such as acetate, ethanol, propionate, etc., from cellulose. The physiology of these reconsti-

tuted cultures is investigated as regards cultural conditions, microbial types, inoculum size, interspecies H2 transfer and specific regulatory phenomena, the accumulation of cellobiose and acetate. S.F.

N81-14426# Department of Energy, Washington, D. C. Office of Environmental Assessments.
TECHNOLOGY CHARACTERIZATIONS: ENVIRONMENTAL INFORMATION HANDBOOK
1980 198 p refs Supersedes DOE/EV-0061/1 Prepared in cooperation with Aerospace Corp., Washington, D.C. and Mitre Corp., Washington, D.C.
(DOE/EV-0072; DOE/EV-0061/1) Avail: NTIS HC A09/MF A01

Assessments of energy technologies are presented along with examples of systems representing each technology. The specific energy systems for which information is provided are grouped as follows: nuclear energy, coal, petroleum, gas, synthetic fuels, solar energy, geothermal energy, and hydroelectricity. T.M.

N81-14427# Army Mobility Equipment Research and Development Center, Fort Belvoir, Va.
LEAD ACID BATTERY PULSE DISCHARGE INVESTIGATION Final Report
Edward Dowgiallo Apr. 1980 28 p refs Sponsored by DOE
(DOE/CH-00128/1) Avail: NTIS HC A03/MF A01

The effects of high current pulses caused by electric vehicle silicon controlled rectifier and and transistor chopper controllers on battery energy, life and microstructure were uncertain in the past. Such high current pulses may have a significant effect on diffusion and reaction rates, conductivity/resistance ratios and crystal morphology of processes occurring within the battery. It is important to learn what processes become rate controlling under such conditions and to determine what may be done through design or regulation to increase the battery efficiency and life under such service. Equipment to measure watt hours with programmable discharge load banks capable of simulating high current pulsed waveforms is described. S.F.

N81-14428# Department of Energy, Washington, D. C.
SOLAR ENERGY: PROGRAM SUMMARY DOCUMENT Fiscal Year, 1981
Aug. 1980 376 p refs
(DOE/CS-0050) Avail: NTIS HC A17/MF A01

Solar programs and the eight solar technologies are discussed, including biomass energy systems, photovoltaic energy systems, wind energy conversion systems, solar thermal power, ocean systems, agricultural and industrial process heat, active solar heating and cooling, passive and hybrid solar heating and cooling. S.F.

N81-14429# Midwest Research Inst., Golden, Colo.
SOLAR THERMAL POWER SYSTEMS Annual Technical Progress Report, FY 1979
1980 194 p refs Sponsored by DOE
(DOE/CS-04042/1) Avail: NTIS HC A09/MF A01

Technical and cost readiness of mid and high temperature solar concentrating collector systems are examined. Topics covered include: 1) small power subsystems and component development; 2) small power systems and applications; 3) large power subsystems and component development; 4) large power system and applications; 5) advanced sybsystems; 6) advanced components; 7) material technology; and 8) supporting programs. S.F.

N81-14430# Engelhard Minerals and Chemicals Corp., Edison, N. J. Research and Development Dept.
CATALYST AND PROCESS DEVELOPMENT FOR HYDROGEN PREPARATION FROM FUTURE FUEL CELL FEEDSTOCKS Quarterly Report, 1 Apr. - 30 Jun. 1980
R. M. Yarrington, I. R. Feins, and H. S. Hwang Jul. 1980 32 p
(Contract DE-AC03-79ET-15383)
(DOE/ET-15383-22) Avail: NTIS HC A03/MF A01

Four types of tests were run on the small scale catalyst screening unit. The operating line for coke-free operations was found to be approximately between 0.41 to 0.44 02/C level. Screening at lower 02/C levels lead to problems with plugging. Increased severity for screening steam reforming catalysts was obtained by doubling the space velocity. Tests were run to determine the gas composition from the catalytic partial oxidation (CPO) section and to evaluate two CPO catalysts. Catalysts were aged for about 20 hours using a propane, steam, and air mixture before testing with No. 2 oil for another five hours. This latter test was used to study Pt/Rh catalysts made with various supports. Differences were readily determined for Pt/Rh supported on alpha alumina and Pt/Rh supported on stabilized alumina. Several samples must be evaluated by this method before aging runs are made in the larger unit. After leaching alumina from a used Pt/Rh catalyst, the XRD pattern showed the presence of a Pt-Rh alloy in the metal residue. Experiments were run to show that the alloy was formed in the reactor during testing and not during catalyst preparation. A larger version of the ATR reactor was designed and major components are on order. Author

N81-14431# SRI International Corp., Menlo Park, Calif. Physical Electronics Program.
APPLICATION OF MICROFABRICATION TECHNOLOGY TO THERMIONIC ENERGY CONVERSION Progress Report, 1 May - 31 Jul. 1980
Ivor Brodie 5 Sep. 1980 10 p refs
(Contract DE-AC02-79ET-15423; SRI Proj. 8558)
(DOE/ET-15423/4; PR-4) Avail: NTIS HC A02/MF A01

A method of maintaining micron or submicron spacings over large areas (> 1 sq cm), using metals of different expansion coefficients to eliminate the shear stresses on the insulating pillars separating the electrodes was investigated theoretically. The use of low voltage field emission sources to create ions in a large (approximately 1 mm) interelectrode gap for space charge neutralization was also studied. The theoretical results for both these approaches are highly encouraging. DOE

N81-14432# United Technologies Corp., South Windsor, Conn. Power Systems Div.
DEVELOPMENT OF MOLTEN CARBONATE FUEL CELL POWER PLANT TECHNOLOGY Quarterly Technical Progress Report, 1 Jan. - 31 Mar. 1980
H. C. Healy, R. A. Sanderson, F. J. Wertheim, P. F. Farris, A. P. Mientek, D. L. Maricle, T. A. Briggs, J. L. Preston, Jr., G. A. Louis, M. L. Abrams et al Aug. 1980 93 p refs
(Contract DE-AC01-79ET-15440)
(DOE/ET-15440/2; FCR-2268; QTPR-2) Avail: NTIS HC A05/MF A01

During this quarter, effort was continued in all four major task areas: system studies to define the reference power plant design; cell and stack design, development and verification; preparation for fabrication and testing of the full-scale prototype stack; and developing the capability for operation of stacks on coal-derived gas. Preliminary module and cell stack design requirements were completed. Fuel processor characterization was completed. Design approaches for full-scale stack busbars and electrical isolation of reactant manifolds and reactant piping were defined. Preliminary design requirements were completed for the anode. Conductive nickel oxide for cathode fabrication was made by oxidation and lithiation of porous nickel sheet stock. A method of mechanizing the tape casting process for increased production rates was successfully demonstrated. Theoretical calculations indicated that hydrogen cyanide and ammonia, when present as impurities in the stack fuel gas, will have no harmful effects. Laboratory experiments using higher than anticipated levels of ethylene showed no harmful effects. Author

N81-14433# Tennessee Univ. Space Inst., Tullahoma. Energy Conversion Div.
MHD COAL-FIRED FLOW FACILITY Quarterly Technical Progress Report, Jan. - Mar. 1980
M. C. Altstatt, R. C. Attig, W. E. Baucum, D. A. Brosnan, J. N. Chapman, J. A. Cooper, L. W. Crawford, L. B. Picks, T. E. Dowdy, J. W. Frazier et al 30 May 1980 59 p refs
(Contracts DE-AC02-79ET-10815; EX-76-C-01-1760)
(DOE/ET-10815/47; QR-1) Avail: NTIS HC A04/MF A01

Generator experiments describing local current distributions are reported along with behavior under conditions of imposed leakage. The shelter for a cold flow modeling facility was constructed. A jet turbine combustor was tested for use as a vitiation burner. Samples taken from the exhaust duct showed

that the refractories used performed well in alleviating heat loss while exhibiting acceptable degradation. A resistive power take-off network was designed and implemented. T.M.

N81-14434# Virginia Univ., Charlottesville. Dept. of Environmental Sciences.
COASTAL ZONE WIND ENERGY. PART 1: SYNOPTIC AND MESOSCALE CONTROLS AND DISTRIBUTIONS OF COASTAL WIND ENERGY Final Report
Michael Garstand, Soronadi Nnaji, Roger A. Pielke, John Gusdorf, Charles Lindsey, and Joseph W. Snow Mar. 1980 192 p refs
(Contract DE-AS06-76ET-20274)
(DOE/ET-20274/7-Pt-1) Avail: NTIS HC A09/MF A01

A method of determining coastal wind energy resources is described. Climatological data and a mesoscale numerical model were used to delineate the available wind energy along the Atlantic and Gulf coasts of the United States. The spatial distribution of this energy is dependent on the locations of the observing sites in relation to the major synoptic weather features as well as the particular orientation of the coastline with respect to the large scale wind. The synoptic weather situation at a site was categorized according to its location relative to the wave cyclones on the polar front and to the subtropical ridge. Fundamental physical concepts were used to define these classifications. Six categories describe almost all weather situations: in the warm sector, ahead of the warm front, behind the cold front, under the polar ridge, west of the subtropical ridge, and under the subtropical ridge. The four seasons were defined quantitatively in terms of the variation of these categories within the year. Author

N81-14435# Babcock and Wilcox Co., Alliance, Ohio.
STUDY OF SEED REPROCESSING SYSTEMS FOR OPEN CYCLE COAL FIRED MHD POWER PLANTS. TASK 1: SELECTION OF PROCESSES FOR MORE DETAILED STUDY
17 Jul. 1980 153 p refs
(Contract DE-AC02-79ET-15613)
(DOE/ET-15613/T1) Avail: NTIS HC A08/MF A01

In most of the processes, a portion of the potassium seed material is converted to a compound not containing sulfur. The potassium in this form can, when injected upstream of the MHD channel, capture the sulfur released during the combustion of coal and eliminate the need for flue gas desulfurization equipment. Criteria considered in the evaluation included cost, state of development, seed loss, power requirements, availability, durability, key component risk, environmental impact, safety, controllability, and impurities buildup. T.M.

N81-14436# General Electric Co., Schenectady, N. Y. Energy Systems Programs Dept.
DEVELOPMENT OF MOLTEN CARBONATE FUEL CELL POWER PLANT Quarterly Technical Progress Report, 1 Feb. - 30 Apr. 1980
J. R. Peterson 1980 140 p refs
(Contract DE-AC02-80ET-17019)
(DOE/ET-17019/1) Avail: NTIS HC A07/MF A01

User requirements and power plant subsystem alternatives and characteristics were defined. A total of 27 laboratory cells were operated and a total of nine cells continued on test at the end of the quarter. Investigation of alternative anode and cathode materials proceeded; a dual-porosity anode was fabricated and tested. Over 10,000 endurance hours on a state of the art cell carried-over from a previous program was achieved and 1500 hours endurance was obtained with sheet metal cells. Results presented for electrolyte structure development include comparative data for spray-dried and modified aqueous slurry process powders. Shakedown tests with a rotating disc electrode apparatus for fundamental measurements are described. Concept designs for both prototype and subscale stacks were identified. An overall test plan to commercialization for molten carbonate fuels cells and a functional specification for the tenth-scale stack test facility were proposed. Cost-effective manufacturing assessment of available designs and processes was initiated. Available contaminants concentration and effects information was gathered and initial projections of contaminant ranges and concentrations were prepared. Author

N81-14437# Texas Univ. at Arlington.
SOLAR PHOTOVOLTAIC/THERMAL RESIDENTIAL EXPERIMENT, PHASE 1 Final Report
Ghazi Darkazalli 1 Jul. 1980 54 p refs Prepared in cooperation with Lincoln Lab., MIT, Lexington
(Contract DE-AG02-76ET-20279)
(DOE/ET-20279/103) Avail: NTIS HC A04/MF A01

Month by month energy transfer data between an occupied residence and its energy supply systems are presented. Energy transfer data are divided into different categories depending on how the energy is consumed. Energy transfers between some system components are also categorized. These components include a flat-plate thermal collector array, a flat-plate photovoltaic array, a dc to ac inverter, thermal storage tanks, and a series heat pump. System operations included directing surplus electrical energy (generated by the photovoltaic array) into the local utility grid. The heat pump used off-peak utility power to chill water during the cooling season. Author

N81-14438# Southern Methodist Univ., Dallas, Tex.
THIN FILM CADMIUM TELLURIDE SOLAR CELLS Final Technical Report, 1 Jul. 1979 - 31 Aug. 1980
Ting L. Chu Aug. 1980 52 p refs
(Contract DE-AC04-79ET-23009)
(DOE/ET-23009/T10) Avail: NTIS HC A04/MF A01

Efforts were directed to the construction of apparatus for the chemical vapor deposition of cadmium telluride films, the selection and preparation of substrates, the deposition and characterization of cadmium telluride films, and the fabrication and characterization of solar cells. Cadmium telluride films were deposited on a number of substrates by the direct combination of cadmium and tellurium on the substrate surface at 500 C or higher, at rates of up to 0.6 micrometer/min. The structural, crystallographic, and electrical properties of cadmium telluride films deposited over a wide range of conditions were evaluated. A series of doping experiments were carried out using iodine and indium as the n-type dopant, and phosphorus, arsenic, and antimony as the p-type dopant. The In/W/graphite substrates were used for the deposition of n-type films with an ohmic interface. However, no suitable substrates were found to form an ohmic interface with p-type films. Solar cells prepared from these films exhibit relatively good short circuit current density, up to 15 mA/sq cm, but their conversion efficiencies are severely limited by the high series resistance of the devices. E.D.K.

N81-14439# Wisconsin Univ. - Milwaukee.
SYNTHESIS OF RESEARCH AND DEVELOPMENT IN MECHANICAL ENERGY STORAGE TECHNOLOGIES Progress Report, 1 Sep. 1979 - 31 May 1980
Gabor M. Karadi 31 May 1980 12 p refs
(Contract DE-AC02-79ET-26106)
(DOE/ET-16106/T1) Avail: NTIS HC A02/MF A01

Techniques for underground energy storage are described. These techniques include underground pumped hydro storage, second generation compressed air energy storage, and seasonal aquifer thermal energy storage. An economic assessment for each of the techniques is presented. T.M.

N81-14440# RCA Labs., Princeton, N. J.
PHOTOVOLTAIC MECHANISMS IN POLYCRYSTALLINE THIN-FILMS SILICON SOLAR CELLS Quarterly Report, 1 May - 31 Jul. 1980
David Redfield Aug. 1980 20 p refs Sponsored in part by DOE
(DOE/ET-23108/5; QR-4) Avail: NTIS HC A02/MF A01

While seeking to optimize the dopent concentrations and profiles of diffused Si solar cells, it was found that 1000 C is a poor diffusion temperature and 875 C is much better. Attempts to passivate the front surface of cells by 100 percent of grown SiO2 indicate that this oxide is inadequate to reduce the surface recombination velocity. Exposure to atomic hydrogen worsened the blue response of such a cell. Indications exist that good blue performance may still be obtainable with somewhat deeper junctions than normally used. On grain boundaries (GR) in Si, the activating effect of heat treatment on the harmful effects of GB was verified. A slightly modified version of the liquid crystal

technique for observation of the active GB correlates well with the light spot scan technique. Author

N81-14441# Westinghouse Electric Corp., Pittsburgh, Pa.
PHOTOVOLTAIC MECHANISMS IN POLYCRYSTALLINE THIN FILM SOLAR CELLS Technical Progress Report, 1 Nov. 1979 - 31 Jan. 1980
T. A. Temofonte, J. R. Szedon, S. J. Fonash, S. Ashok, and P. A. Lester 1980 53 p *refs* Prepared in cooperation with Pennsylvania State Univ., University Park
(Contract DE-AC01-79ET-23106)
(DOE/ET-23106/2; TPR-2) Avail: NTIS HC A04/MF A01

A Bessel-Fourier series solution was obtained for carrier transport in right cylindrical grains. Various silicon etch formulations with regard to resulting surface and grain boundary morphology and to influences on electrical behavior of cells fabricated from the material. A consistent effect was observed with MIS cells on p base material for which surface etching was done using 25:10:3 and 1:5:5 compositions of the HNO3:HAc:HF etchant. Poor correlation was found between electrical behavior of the small diagnostic cells used and the density of grain boundaries deduced from preferential etch effects of grain surface morphology. Characterization efforts involving comparisons of MS and MIS barrier cells on polycrystalline and single crystal material reveal no etchant related effects; however, the polycrystalline material produces cells whose dark current behavior appears to be controlled by multistep tunneling as regards its temperature and voltage dependence. DOE

N81-14442# RCA Labs., Princeton, N. J.
PHOTOVOLTAIC MECHANISMS IN POLYCRYSTALLINE THIN-FILM SILICON SOLAR CELLS Summary Report, 31 May 1979 - 31 Jan. 1980
David Redfield Feb. 1980 36 p refs
(Contract DE-AC01-79ET-23108)
(DOE/ET-23108/3) Avail: NTIS HC A03/MF A01

Fundamental limitations on the performance of Si solar cells were shown to be quite different from those that were conventionally invoked. Particularly for heavy-doping effects, the usual models were shown to be invalid and a new method was devised for calculating the reverse saturation current of a heavily doped device in which nearly all minority carriers reach the junction (viz., good blue-response). Calculations by the new method show: increased doping above 10 to the 18th power per cu cm does not improve the open-circuit voltage as has been thought, and previous estimates of bandgap narrowing in diffused cells are much too high because of the neglect of Auger recombination effects. Also of importance are the effects of doping gradients and their relation to the properties of the front surface of a diffused-junction cell. These experiments led to a new, simple method of separating the internal optoelectronic properties of a solar cell (or optical detector) from the reflectance properties of the front surface. This method thus provides a direct means of evaluating the effectiveness of antireflection coatings on such devices. Author

N81-14443# EIC, Inc., Newton, Mass.
ELECTRODEPOSITION OF POLYCRYSTALLINE AND AMORPHOUS SILICON FOR PHOTOVOLTAIC APPLICATIONS Quarterly Technical Progress Report, 1 Dec. 1979 - 29 Feb. 1980
R. D. Rauh Jul. 1980 36 p refs
(Contract DE-AC03-79ET-23046)
(DOE/ET-23046/3; QTPR-3) Avail: NTIS HC A03/MF A01

Plating experiments with SiHCl3 solutions in propylene carbonate with 0.1 M tetrabutylammonium tetrafluoroborate are described. Silicon was deposited on ITO glass (Nesatron) as well as Mo substrates at temperatures from 25-80 C. Both potentiostatic and galvanostatic conditions were used. The high resistance of the films limited the thickness which could be deposited by either method to less than 5 micrometers. Deposition beyond this limit resulted in a deterioration of the film quality. X-ray analysis of the films confirmed that they were amorphous. SEM analysis of the films revealed a very porous structure with nodules about 1 micrometer in diameter. Annealing the deposit at 400 C in an Ar:H2 atmosphere resulted in a slightly smoother surface but the nodules remained. The films deposited on ITO glass had a band gap of about 1.0 eV and an EO4 value of 1.5-2.0 eV. The Auger analysis of the films showed the presence of large amounts of oxygen in the samples that had been exposed to air. Author

N81-14444# Mobil Tyco Solar Energy Corp., Waltham, Mass.
A 25 kW SOLAR PHOTOVOLTAIC FLAT PANEL POWER SUPPLY FOR AN ELECTRODIALYSIS WATER DESALINATION UNIT IN NEW MEXICO Final Report, 1 Oct. 1978 - 31 May 1979
J. R. Wood and J. L. Crutcher Jun. 1980 100 p refs
(Contract DE-AC04-78ET-23061)
(DOE/ET-23061/1) Avail: NTIS HC A05/MF A01

The stand-alone system consists of a flat panel array employing silicon ribbon solar cells, used in conjunction with a lead-acid battery bank. Electrodialysis is an energy-conservative process for the desalination of water, in which ions are transferred from one solution through a membrane into another solution by imposition of a direct electrical current. The system design is intended to be prototypical of part of the drinking water supply for a remote village. The specific task of this system is to aid in the restoration of an aquifer following a uranium leaching operation. Author

N81-14445# Eagle-Picher Industries, Inc., Miami, Okla. Specialty Materials Div.
BORON ARSENIDE THIN FILM SOLAR CELL DEVELOPMENT Final Report
Jack L. Boone and Thomas P. VanDoren Sep. 1980 137 p refs
(Contract DE-AC04-79ET-23011)
(DOE/ET-23011/1) Avail: NTIS HC A07/MF A01

Pyrolytic decomposition of diborane and arsine was used in attempts to grow polycrystalline BAs films. This method produced only amorphous films for deposition temperatures below 920 C and polycrystalline boron subarsenide (B12As2) films for deposition temperatures above this value. The amorphous films were determined to have a significant arsenic content but the actual stoichiometry was not obtained. The films were adherent on single crystal sapphire (0001), (111) silicon, (0001) SiC, and polycrystalline SiC but were found not to be adherent to substrates of fused quartz, tungsten, and molybdenum. It was also found that all films deposited above 650 C were p-type while those deposited below 600 C were usually n-type. Polycrystalline BAs and B12 As2 was produced by reaction of the elements in a closed tube. Reflectance data on the amorphous films indicate a probable additional optical transition between 3.0 and 3.5 eV. Measurements of a capacitor structure using a polycrystalline BAs pressed pellet gave an index of refraction of 1.9 at 15 KHz. Infrared studies show a possible significant amount of boron hydrogen bonding along with evidence indicating carbon hydrogen bonding. Author

N81-14446# Southern Methodist Univ., Dallas, Tex.
THIN FILM CADMIUM TELLURIDE SOLAR CELLS Final Technical Report, 1 Jul. 1979 - 31 Aug. 1980
Ting L. Chu Jul. 1980 54 p refs
(Contract DE-AC04-79ET-23009)
(DOE/ET-23009/T11) Avail: NTIS HC A04/MF A01

The construction of apparatus for the chemical vapor deposition of cadmium telluride films, the selection and preparation of substrates, the deposition and characterization of cadmium telluride films, and the fabrication and characterization of solar cells are described. Cadmium telluride films were deposited on a number of substrates by the direct combination of cadmium and tellurium on the substrate surface at 500 C or higher at rates of up to 0.6 micrometers per min. The structural, crystallographic, and electrical properties of cadmium telluride films deposited over a wide range of conditions were evaluated. A series of doping experiments were carried out using iodine and indium as the n type dopant, and phosphorus, arsenic, and antimony as the p type dopant. In/W/graphite substrates were used for the deposition of n type films with an ohmic interface. Solar cells prepared from these films exhibit relatively good short circuit current density but their conversion efficiencies are severely limited by the high series resistance of the devices. Author

N81-14447# Purdue Univ., Lafayette, Ind. Energy Sources and Systems Simulation Lab.

SECURITY ASSESSMENT OF POWER SYSTEMS Progress Report, 1 Oct. - 1 Dec. 1979
D. P. Carroll and P. C. Krause Jan. 1980 23 p refs
(Contracts EC-77-S-02-4206; DE-AS02-77ET-29100)
(DOE/ET-29100/11) Avail: NTIS HC A02/MF A01

Wind turbulence models and their effect on unsteady shaft torque of horizontal machines were studied. Reduced order aerodynamic models of wind machines were developed. T.M.

N81-14448# Little (Arthur D.), Inc., Cambridge, Mass.
COMMERCIALIZATION STRATEGY FOR LEAD/ACID BATTERIES IN UTILITY LOAD LEVELING APPLICATIONS
Jun. 1980 159 p
(Contract DE-AC01-77ET-26934)
(DOE/ET-26934/1) Avail: NTIS HC A08/MF A01

The plan is in part, based on an assessment of market demand made by MITRE/METREK. The specific financial requirements of both the battery manufacturers and the electric utilities were analyzed and accounted for when developing the approach. Since the success of the programs and the costs depend critically on how the prices of different fuels change with time, and these prices could be affected by political decisions, it is left to the judgement of the officials responsible for program priorities to decide whether the benefits that would result from this plan warrant the likely risks or costs to the government.
Author

N81-14449# Department of Energy, Washington, D. C.
PREDESIGN ENERGY ANALYSIS: A NEW GRAPHIC APPROACH TO ENERGY CONSCIOUS DESIGN FOR BUILDINGS
Sep. 1980 84 p refs
(Contract EC-88-C-01-8694)
(DOE/CS-0171) Avail: NTIS HC A05/MF A01

An energy efficient design includes two interrelated elements: physical design characteristics which minimize testing, cooling, and lighting loads; and mechanical and electrical subsystems which meet energy loads efficiently. The technique described focuses on the first aspect: manipulation of design variables to effectively reduce excessive heat gains and losses. T.M.

N81-14450# Mitre Corp., McLean, Va.
SUMMARY OF SOLAR ENERGY TECHNOLOGY CHARACTERIZATIONS Characterization Reports, 1978 - 1979
Sep. 1980 190 p refs Sponsored by DOE Prepared in cooperation with Argonne National Lab., Oak Ridge National Lab., Los Alamos Scientific Lab., and California Univ., Lawrence Berkeley Lab.
(DOE/EV-0099) Avail: NTIS HC A09/MF A01

The design, operating, energy, environmental, and economic characteristics of 38 model solar systems used in the Technology Assessment of Solar Energy Systems Project are summarized. The generic systems designs utilized were based on systems studies and mission analyses performed by the DOE National Laboratories and the MITRE Corporation. Their purpose was to formulate materials and engineering cost data and performance data of solar equipment once mass produced. Author

N81-14451# Los Alamos Scientific Lab., N. Mex.
DECENTRALIZED SOLAR PHOTOVOLTAIC ENERGY SYSTEMS
Milton C. Krupka Sep. 1980 111 p refs Sponsored in part by DOE
(DOE/EV-0101) Avail: NTIS HC A06/MF A01

Emphasis was placed upon the selection and use of a model residential photovoltaic system to develop and quantify the necessary data. The model consists of a reference home located in Phoenix, AZ utilizing a unique solar cell array roof shingle combination. Silicon solar cells, rated at 13.5 percent efficiency at 28 C and 100 mW/sq cm insolation are used to generate 10 kW (peak). An all electric home is considered with lead acid battery storage, dc ac inversion and utility backup. The reference home is compared to others in regions of different insolation. It is suggested that solar cell materials production and fabrication may have the major environmental impact when comparing all facets of photovoltaic system usage. Fabrication of the various types of solar cell systems involves the need, handling, and transportation of many toxic and hazardous chemicals with attendant health and safety impacts. Increases in production of such materials as lead, antimony, sulfuric acid, copper, plastics, cadmium and gallium will be required should large scale usage of photovoltaic systems be implemented. Author

N81-14452# Los Alamos Scientific Lab., N. Mex.
THE CHARACTERIZATION AND ASSESSMENT OF SELECTED SOLAR THERMAL ENERGY SYSTEMS FOR RESIDENTIAL AND PROCESS HEAT APPLICATIONS
Jack C. Hyde Sep. 1980 54 p refs Sponsored in part by DOE
(DOE/EV-0102) Avail: NTIS HC A04/MF A01

Results of studies of seven solar thermal energy applications are presented. Five of these are residential applications: space heating--active liquid, space heating--active air, domestic hot water--active, space heating--passive, and space heating and cooling--active liquid. Denver, Colorado, was selected as a representative location for each of the above applications. The remaining two applications produce industrial process heat: a flat plate collector system producing 50 C - 100 C hot water for a commercial laundry in Indianapolis, Indiana; and a concentrating collector system that could produce 100 C - 300 C process heat adequate to the needs of a pulp mill in Madison, Wisconsin. Author

N81-14453# Los Alamos Scientific Lab., N. Mex.
TECHNOLOGY ASSESSMENT OF WIND ENERGY CONVERSION SYSTEMS
B. W. Meier and T. J. Merson Sep. 1980 48 p refs Sponsored in part by DOE
(DOE/EV-0103) Avail: NTIS HC A03/MF A01

Two candidates that might be deployed if this technology makes a significant contribution to the national energy requirements were chosen. One is a large machine of 1.5 MW rated capacity that can be used by utilities. The other is a small machine that is characteristic of units that might be used to meet residential or small business energy requirements. Energy storage systems are discussed for each machine. Cost estimates were made for both large and small systems. Material requirements are discussed and a general discussion of environmental impacts is presented. The site specific nature and the design dependency of these impacts are discussed as the wind energy resource is not constant in all regions of the nation. Author

N81-14454# Idaho State Office of Energy, Boise.
INDUSTRIAL APPLICATION OF GEOTHERMAL ENERGY IN SOUTHEAST IDAHO
James A. Batdorf, David W. McClain, Mark Gross, and George M. Simmons Feb. 1980 86 p refs
(Contract DE-FC07-79ID-12010)
(DOE/ID-12010/4) Avail: NTIS HC A05/MF A01

The main industries in Southeastern Idaho are phosphorus/phosphate production and potato processing. Most of the energy required in the phosphate industries is electrical and therefore not replaceable by direct application of geothermal energy. The main area for direct use of geothermal energy in the phosphate industry is for drying of the ore at the mine site; however, most of this is energy now supplied by waste heat from the calcining process. There exists a large need for a dedicated supply of electrical energy to these industries and the possibility of using geothermal energy to generate electricity for these areas should be investigated. The potato processing industry uses most of its energy to provide process steam for drying and cooking. Geothermal energy can potentially replace most of these energy requirements provided a high energy source temperature can be located. A 200 F geothermal source could supply about 40% of the industry's needs. A 400 F geothermal source could supply nearly 90% of the industry's needs. Author

N81-14455# Department of Energy, Morgantown, W. Va.
EFFECTS OF SEVERAL TRACE CONTAMINANTS ON FUEL CELL PERFORMANCE
Su-Moon Park (New Mexico Univ., Albuquerque) and Thomas J. OBrien Aug. 1980 29 p refs
(DOE/METC/RI-80/16) Avail: NTIS HC A03/MF A01

The electrochemical reactivity of Hg/HgS, PbS, CdS, Sn/SnCl2/SnCl4, and TiO2 in coal gas at the nickel anode and the nickel oxide cathode were examined thermodynamically.

Calculations indicate that only SnCl4 would undergo reduction at the cathode to SnCl2. Other species would remain intact. Contaminants such as H2S/SO2 and HC1 were included in the calculation. The results are consistent with the limited observations. Possible chemical interactions between contaminants and electrodes or electrolytes were examined. Reactions with the nickel anode have negative free energies. Mercury would interact physically with the anode by forming an alloy. Reactions with the nickel oxide cathode also have negative free energies. Reactions with carbonates have large negative free energies. Born's model of ion transfer was used to calculate the free energy change for the transfer of ions from aqueous solution to the molten carbonate solution. Author

N81-14456# Department of Energy, Washington, D. C.
LOW ENERGY FUTURES FOR THE UNITED STATES
Jun. 1980 152 p refs
(DOE/PE-0020) Avail: NTIS HC A08/MF A01

The range of available technologies and public policies which can reduce future U.S. primary energy consumption to below current levels while contributing to continued improvements in the standard of living was examined. Estimates of the efficiency improvements in buildings and appliances, industrial processes, and transportation are summarized. Brief summaries of ten major studies of possible low energy futures are included. T.M.

N81-14457# Booz-Allen and Hamilton, Inc., Bethesda, Md.
ASSESSMENT OF INDUSTRIAL ACTIVITY IN THE UTILIZATION OF BIOMASS FOR ENERGY
Sep. 1980 201 p refs
(Contract DE-AC03-79PE-70090)
(DOE/PE-70090/01) Avail: NTIS HC A10/MF A01

Federal programs in biomass energy are defined by identifying the status and objectives of private sector activity in the biomass field as of mid 1979. The industry's perceptions of government activites are characterized. Findings and conclusions are based principally on confidential interviews with executives in 95 companies. These included forest products companies, agricultural products companies, equipment manufacturers, electric and gas utilities, petroleum refiners and distributors, research and engineering firms, and trade organizations. The study focused on four key questions: (1) what is the composition of the biomass industry? (2) what are the companies doing? (3) what are their objectives and strategies? (4) what are the implications for government policy? S.F.

N81-14458# California State Coll., Bakersfield.
THE DESIGN CONSTRUCTION AND TESTING OF A LIQUID-HEATING FLAT-PLATE SOLAR COLLECTOR
Robert Edward Tuttle Feb. 1980 25 p refs Sponsored by DOE
(DOE/CS-34223/T1) Avail: NTIS HC A02/MF A01

A liquid heating, flat plate solar collector, easy to build and capable of space and water heating, was designed, constructed and tested. S.F.

N81-14459# Environmental Research Inst. of Michigan, Ann Arbor.
DEMONSTRATION OF AN ADVANCED SOLAR GARDEN WITH A WATER CEILING Final Technical Progress Report, 1 Jul. 1979 - 30 Jun. 1980
R. Maes, Catherine Riseng, G. Thomas, and M. Mandeville Sep. 1980 77 p refs
(Grant DE-FG02-79R5-10122)
(DOE/R5-10122/2) Avail: NTIS HC A05/MF A01

Experimental procedures for evaluating the water ceiling as an integral part of an ongoing garden agricultural experiment are discussed and the results presented. The water ceiling proved useful in providing extra thermal capacity to the solar garden. It provides heat at night after the water was warmed during the day, and retards overheating in the daytime by absorbing infrared energy into the water. In growing nonflowering plants such as lettuce and Chinese cabbage, the water ceiling showed no noticeable degradation in yield or maturation rate. In flowering plants such as tomatoes, the reduced light levels delayed yields by a couple of weeks but the total yield was only slightly diminished. In geographic areas where there is less cloud cover than in Michigan, the water ceiling could be more effective. Author

N81-14460# General Electric Co., Schenectady, N. Y. Energy Systems Programs Dept.
ALTERNATE CENTRAL RECEIVER POWER SYSTEM PROGRAM, PHASE 2. VOLUME 1: COMMERCIAL PLANT DESIGN REFINEMENT Midterm Technical Report
J. C. Amos, A. V. Curinga, J. A. Elsner, E. E. Gerrels, C. C. Hussey, D. J. Muller, H. P. Offer, G. Oganowski, E. Olich, B. D. Pomeroy et al Jul. 1980 220 p refs
(Contract DE-AC03-79SF-10534)
(DOE/SF-10535/1-1) Avail: NTIS HC A10/MF A01

Selected design improvements included an operating mode analysis, a refined plant configuration, and cost estimates. The system's annual performance was also analyzed and a computer program listing for the analysis is presented. T.M.

N81-14461# Battelle Columbus Labs., Ohio.
SOLAR ENERGY EMPLOYMENT AND REQUIREMENTS, 1978 - 1985. SUMMARY AND HIGHLIGHTS
Girard W. Levy and Jennifer Field Apr. 1980 210 p refs
(Contract EG-77-G-01-6037)
(DOE/TIC-1154) Avail: NTIS HC A10/MF A01

The characterization of establishments engaged in solar energy work and the number and occupational distribution of persons working in solar energy activities in 1978 are described. Future solar manpower requirements through 1983 are projected. Included were all types of solar energy technologies and applications (space heating and cooling, water heating, industrial process heat, thermal power, ocean thermal conversion, photovoltaic conversion, wind conversion and biomass conversion), and all phases of work (research and development, manufacturing, marketing and distribution, and installation and maintenance). L.F.M.

N81-14462# Tennessee Univ., Knoxville.
AN ENERGY AND COST ANALYSIS OF RESIDENTIAL HEAT PUMPS IN NORTHERN CLIMATES
J. K. Martin and D. L. ONeal 1980 6 p refs
(Contract W-7405-eng-26)
(DOE/TIC-11275) Avail: NTIS HC A02/MF A01

Lack of natural gas and high oil prices, combined with the large energy costs of electric resistance heat have forced renewed attention to the heat pump in colder climates. The diversity in heating energy use and cost effectiveness of forty-one currently retailed heat pumps in three northern cities, Boston, Denver, and Minneapolis, were examined. Heat pump heating energy use and annualized life cycle costs were compared with other forms of space heating equipment in those same cities. Author

N81-14463# Engelhard Minerals and Chemicals Corp., Edison, N. J. Research and Development Dept.
CATALYST AND PROCESS DEVELOPMENT FOR HYDROGEN PREPARATION FROM FUTURE FUEL CELL FEEDSTOCKS Quarterly Progress Report, 1 Jan. - 31 Mar. 1980
R. M. Yarrington, I. R. Feins, and H. S. Hwang Apr. 1980 28 p
(Contract DE-AC03-79ET-15383)
(DOE/ET-15383/18) Avail: NTIS HC A03/MF A01

Catalysts were screened to steam reform hydrocarbons in an autothermal reformer. Twenty-one samples were screened in a one inch diameter reactor using No. 2 oil as the hydrocarbon feed. A series of platinum rhodium catalysts were evaluated to study the effect of varying compositions. A sample containing 1.7% Pt/0.3% Rh was most active but the difference among the samples was within the range of test variability. The effect of O2/C level on the gas composition leaving the CPO section was determined. The amount of unreacted oil increases as O2/C level decreases. The unreacted oil is more aromatic than the feedstock. The gas composition contains considerably more olefins as the O2/C level decreases. Post run catalyst characterization indicated that the catalyst carrier does not deteriorate in the ATR test. Drastic decrease in CO chemisorption is noted on the Pt/Rh samples. This decline in CO chemisorption could either be due to metal sintering or to carbon deposition on the metal. Author

N81-14464# Battelle Pacific Northwest Labs., Richland, Wash.
RESIDENTIAL HEATING COSTS: A COMPARISON OF GEOTHERMAL SOLAR AND CONVENTIONAL RESOURCES
Clem H. Bloomster, Bobi A. Garrett-Price, and Linda L. Fassbender Aug. 1980 202 p refs
(Contract DE-AC06-76RL-01830)
(PNL-3200) Avail: NTIS HC A10/MF A01

The costs of residential heating throughout the United States using conventional, solar, and geothermal energy were determined under current and projected conditions. These costs are very sensitive to location, being dependent on the local prices of conventional energy supplies, local solar insolation, climate, and the proximity and temperature of potential geothermal resources. The sharp price increases in imported fuels during 1979 and the planned decontrol of domestic oil and natural gas prices have set the stage for geothermal and solar market penetration in the 1980's. DOE

N81-14465# ROM-AIRE Solar Corp., Avon Lake, Ohio.
LOW COST BARE-PLATE SOLAR AIR COLLECTOR
William L. Maag, Carl J. Wenzler, Frank E. Rom, and David R. VanArsdale Sep. 1980 68 p refs
(Grant DE-FG02-79R5-10143)
(DOE/R5-10143/T1) Avail: NTIS HC A04/MF A01

A low cost, bare plate solar collector for preheating ambient air was developed. This type of solar heating system would be applicable for preheating ventilation air for public buildings or other commercial and industrial ventilation requirements. Two prototype collectors were designed, fabricated and installed into an instrumented test system. Tests were conducted for a period of five months. Results of the tests showed consistent operating efficiencies of 60 percent or greater with air preheat temperature uses up to 20 degrees for one of the prototypes. The economic analyses indicated that this type of solar system was economically viable. For the materials of construction and the type of fabrication and installation perceived, costs for the bare plate solar collector are attainable. Applications for preheating ventilation air for schools were evaluated and judged to be economically viable. S.F.

N81-14466# Battelle Pacific Northwest Labs., Richland, Wash.
ADVANCED CONCEPTS TEST FACILITY: MEASUREMENTS AND SUGGESTED TEST PLAN Interim Report
F. R. Zaloudek, L. J. Brown, and R. T. Allemann Sep. 1980 114 p refs
(Contract DE-AC06-76RL-01830; EPRI Proj. 422-3)
(EPRI-CS-1530) Avail: NTIS HC A06/MF A01

The Advanced Concepts Test (ACT) Facility is being designed to test an advanced concept of dry cooling that uses intermediate ammonia heat transport and water augmentation. The instrumentation and test strategies at the design criteria stage that will accomplish the objective of determining the performance and operational feasibility of the advanced cooling tower and some of its components are described. The accuracy of measurement and statistical treatment of the results are discussed extensively. The various types of tests are described and the data acquisition system logging of the data are also covered. The document contains listings of the instrumentation, the data acquisition system connections, and tables of run plan strategies for several types of tests. The general indication is that the specified instrumentation will be sufficiently accurate to evaluate the performance of, and the design formulations for this type of dry or dry/wet cooling tower. DOE

N81-14467# Synergic Resources Corp., Bala-Cynwyd, Pa. Utilization and Conservation Program.
INDUSTRIAL COGENERATION CASE STUDIES Final Report
D. R. Limaye, S. Isser, B. Hinkle, and N. R. Friedman Sep. 1980 129 p Prepared for Electric Power Research Inst., Palo Alto, Calif.
(EPRI Proj. 1276-1)
(EPRI-EM-1531) Avail: NTIS HC A07/MF A01

Studies were performed on a number of operating cogeneration systems to determine application, economics, and attitudes of industrial and utility executives toward cogeneration. A literature survey was conducted and an identification of candidate cogeneration sites was carried out. This was followed by a screening of these sites down to 20 to 30 candidate sites. The screening was carried out on the basis of cogeneration capacity, geographical diversity, generation type, and industrial diversity. The remaining sites were contacted as to their willingness to work with EPRI, and an industrial questionnaire was developed on technical, economic, and institutional cogeneration issues. Each of the seventeen sites was visited during this task. A utility questionnaire was developed and utilities with cogeneration systems studied in this survey were contacted as to their attitudes toward cogeneration. In addition, a compilation of a list of operating cogeneration systems was performed. DOE

N81-14468# General Electric Co., St. Petersburg, Fla.
CALCIUM/CALCIUM CHROMATE THERMAL BATTERY AND THERMAL BATTERY ASSIGNMENT AT THE GENERAL ELECTRIC NEUTRON DEVICES DEPARTMENT
J. B. Neale and R. D. Walton 10 Oct. 1980 39 p
(Contract DE-AC04-76DP-00656)
(GEPP-TIS-529) Avail: NTIS HC A03/MF A01

A nontechnical overview of thermal battery design and fabrication methods is given. A thermal battery is a primary, reserve electrochemical power source; that is, it can be used only once and then for a relatively short period, measured in minutes. To energize the battery, an external electrical signal ignites a heat source in the battery to melt the electrolyte and initiate an electrochemical reaction. The battery is made up of several series-connected cells, each with an anode, a cathode, and a current collector. A cell's anode is calcium; its cathode is hexavalent chromium. The electrochemical reaction takes place when the electrolyte is melted by heat suppled from ignition of an iron potassium perchlorate disk. Since no reaction occurs while the electrolyte is in the solid state, the battery does not deteriorate with time and has a shelf life exceeding 20 years. DOE

N81-14469# Brookhaven National Lab., Upton, N. Y. National Center for Analysis of Energy Systems.
STRATEGIC COST-BENEFIT ANALYSIS OF ENERGY POLICIES: COMPARATIVE ANALYSIS
Harry Davitian, Paul J. Groncki, Peter Kleeman, Joan Lukachinski, Richard J. Goettle, IV (Jorgensen (Dale W.) Associates), and Edward A. Hudson (Jorgensen (Dale W.) Associates) Oct. 1979 37 p refs
(Contract DE-AC02-76CH-00016)
(BNL-51128) Avail: NTIS HC A03/MF A01

This study describes three possible energy strategies and analyses each in terms of its economic, environmental, and national security benefits and costs. Each strategy is represented by a specific policy. In the first strategy no additional programs or policies are initiated beyond those currently in effect or announced. The second is directed toward reducing the growth in energy demand, i.e., energy conservation. The third promotes increased domestic supply through accelerated development of synthetic and unconventional fuels. The analysis focuses on the evaluation and comparison of these strategy alternatives with respect to their energy, economic, and environmental consequences. The results indicate that conservation can substantially reduce import dependence and slow the growth of energy demand, with only a small macroeconomic cost and with substantial environmental benefits; the synfuels policy reduces imports by a smaller amount, does not reduce the growth in energy demand, involves substantial environmental costs and slows the rate of economic growth. E.D.K.

N81-14470# Systems Control, Inc., Palo Alto, Calif.
SATELLITE POWER SYSTEM: UTILITY IMPACT STUDY Final Report
J. G. Bohn, J. W. Patmore, and H. W. Zaininger Sep. 1980 70 p refs Sponsored by Electric Power Research Inst.
(EPRI-AP-1548; TPS-79-752) Avail: NTIS HC A04/MF A01

The reference system design would utilize 60 satellites in geosynchronous orbits. Each satellite would collect solar energy and convert it to electricity by means of a 55 sq km array of photovoltaic cells. This dc electricity would then be converted to microwave and transmitted to a 130 sq km receiving antenna on the ground, where it would be reconverted to dc and then ac electricity before being fed into the conventional utility power

system. Each satellite would deliver approximately 5 GW of power at the utility interface. It is estimated that each 5 GW satellite and ground receiving antenna plus associated equipment would cost $10 to 20 billion (1977 dollars), with the entire 60 satellite system costing $600 billion to 1.2 trillion. This amounts to $2000 to 4000 per kW. Although there are serious technical problems to be solved befor the SPS would be feasible, the cost of the system may be the greatest obstacle to its implementation. DOE

N81-14471# California Univ., Berkeley.
COMPARATIVE ASSESSMENT OF FIVE POTENTIAL SITES FOR HYDROTHERMAL MAGMA SYSTEMS: GEOCHEMISTRY
Art F. White, W. S. Baldridge, T. M. Gerlach, and K. Knauss Aug. 1980 81 p refs
(Contract W-7405-eng-48)
(LBL-11410) Avail: NTIS HC A05/MF A01

A brief discussion is given of the geochemical objectives and questions that must be addressed in such an evaluation. A summary of the currently published literature that is pertinent in answering these questions is presented for each of the five areas: The Geysers Clear Lake region, Long Valley, Rio Grand Rift, Roosevelt Hot Springs, and the Salton Trough. The major geochemical processes associated with proposed hydrothermal sites are categorized into three groups for presentation: geochemistry of magma and associated volcanic rocks, geochemistry of hydrothermal solutions, and geochemistry of hydrothermal alternation. DOE

N81-14472# California Univ., Berkeley. Lawrence Berkeley Lab. Earth Sciences Div.
TWO WELL STORAGE SYSTEMS FOR COMBINED HEATING AND AIRCONDITIONING BY GROUNDWATER HEAT-PUMPS IN SHALLOW AQUIFERS
Walter Pelka Jul. 1980 81 p refs Prepared in cooperation with Technische Hochschule, Aachen, West Germany
(Contract W-7405-eng-48)
(LBL-11302) Avail: NTIS HC A05/MF A01

The use of soil and ground water as an energy source and heat storage systems for heat pumps in order to conserve energy in heating and air conditioning buildings is discussed. Information is included on heat pump operation and performance, aquifer characteristics, soil and ground water temperatures, and cooling and heating demands. Mathematical models are used to calculate flow and temperature fields in the aquifer. It is concluded that two well storage systems with ground water heat pumps are desirable, particularly in northern climates. DOE

N81-14473# Los Alamos Scientific Lab., N. Mex.
MAGNETIC ENERGY STORAGE
John D. Rogers 1980 7 p refs Presented at the Appl. Superconductivity Conf., Santa Fe, N. Mex., 20 Sep. - 3 Oct. 1980
(Contract W-7405-eng-36)
(LA-UR-80-2589; CONF-800980-5) Avail: NTIS HC A02/MF A01

The fusion program embraces low loss superconductor strand development with integration into cables capable of carrying 50 kA in pulsed mode at high fields. This evolvement was paralleled with pulsed energy storage coil development and testing from tens of kJ at low fields to a 20 MJ prototype Tokamak induction coil at 7.5 T. Energy transfer times have ranged from 0.7 ms to several seconds. Electric utility magnetic storage for prospective application is for diurnal load leveling with massive systems of store 10 GWh at 1.8 K in a dewar structure supported on bedrock underground. An immediate utility application is a 30 MJ system to be used to damp power oscillations on the Bonneville Power Administration electric transmission lines. An off shoot of this last work is a program for electric utility VAR control with the potential for use to suppress subsynchronous resonance. This paper presents work in progress, work planned, and recently completed unusual work. DOE

N81-14474# United Engineers and Constructors, Inc., Philadelphia, Pa. Engineering Technology Div.
DISTRICT HEATING/COGENERATION APPLICATION STUDIES FOR MINNEAPOLIS-ST. PAUL AREA. MODIFICATIONS OF THE EXISTING UNITS AT THE HIGH BRIDGE POWER PLANT TO COGENERATION FOR HOT WATER DISTRICT HEATING
G. A. Englesson, M. C. Casapis, G. F. Pavlenco, B. Menaker, N. H. Lee, L. Denesdi, and D. E. Williamson Oct. 1980 148 p refs Sponsored in part by Northern States Power Co.
(Contract W-7405-eng-26)
(ORNL/TM-6830/P9) Avail: NTIS HC A07/MF A01

This evaluation required examinations of the equipment, the operating reports, and the technical manuals and drawings. The evaluation also included discussions with the plant staff and with the major vendors of the operating equipment. Units 3, 5, and 6 were recommended for conversion to cogeneration unit 3 to be converted to back pressure operation and units 5 and 6 to be converted to condensing tail operation. Unit 4 was not recommended for conversion. DOE

N81-14475# Rockwell International Corp., Golden, Colo.
TECHNICAL AND MANAGEMENT SUPPORT FOR THE DEVELOPMENT OF SMALL WIND SYSTEMS Annual Report, 1 Oct. 1978 - 28 Sep. 1979
Dec. 1979 127 p refs
(Contract DE-AC04-76DP-03533)
(RFP-3126/3533/80/2) Avail: NTIS HC A07/MF A01

The Rocky Flats Wind Systems Program is described in terms of the objectives, approach, and achievements of the program and each of its task areas during the period October 1, 1978 - September 28, 1979. Additional testing of 17 small wind energy conversion systems was conducted and include controlled velocity and vibration testing of SWECS. Work on eight design and analysis projects for advanced prototypes in three size ranges progressed through a series of design reviews and fabrication was initiated. DOE

N81-14476# Rockwell International Corp., Golden, Colo.
TECHNICAL AND MANAGEMENT SUPPORT FOR THE DEVELOPMENT OF SMALL WIND SYSTEMS: FY 1980 PROGRAM SUMMARY
1 Mar. 1980 41 p
(Contract DE-AC04-76DP-03533)
(RFP-3121/3533/80/8) Avail: NTIS HC A03/MF A01

An overview of the Rocky Flats Small Wind Systems Program is given. The manufacture of small wind energy conversion systems by the private sector and utilization of these systems by the public are discussed. The current program is described in terms of its objectives and role, interprogram relationships, program administration, activity highlights, and plans for 1980 as well as projections through 1982. DOE

N81-14477# Brookhaven National Lab., Upton, N. Y.
AMMONIA AS A HYDROGEN ENERGY-STORAGE MEDIUM
G. Strickland Aug. 1980 8 p refs Presented at 5th Ann. Thermal Storage Meeting, McLean, Va., 10 Oct. 1980
(Contract DE-AC02-76CH-00016)
(BNL-28293; CONF-801055-2) Avail: NTIS HC A02/MF A01

Liquid hydrogen methanol, and ammonia are compared as hydrogen energy storage media on the basis of reforming the MeOH to produce H2 and dissociating (cracking) the NH3 to release H2. The factors in this storage concept are discussed. In terms of energy input for media manufacture from natural gas hydrogen energy content of the medium, and energy cost, NH3 has a wide advantage and comes the closest to matching gasoline. The tasks required in developing a safe and practical hydrogen energy storage system based on the storage and cracking of NH3 are listed. DOE

N81-14478# Westinghouse Electric Corp., Pittsburgh, Pa. Research and Development Center.
AIR/GAS SYSTEM DYNAMICS OF FOSSIL FUEL POWER PLANTS. VOLUME 3: EXPERIMENTAL PRESSURE TEST DATA OF A 500 MW UNIT AND OF A 125 MW UNIT Final Report
D. N. Wormley, D. Rowell, and J. E. Brown, Jr. Sep. 1980 113 p refs Prepared in cooperation with MIT, Cambridge, and NUS Corp., Clearwater, Fla.
(EPRI Proj. 1651-3)

(EPRI-CS-1444-Vol-3) Avail: NTIS HC A06/MF A01

Methods were developed for instrumenting plants and analyzing data to identify sources of air/gas system dynamic problems. These techniques were applied to two oil-fired, balanced draft plants to obtain data for cold and hot operation. The data analysis identified low frequency periodic oscillations in both plants that resulted from air preheater rotation. Also pressure spectra were measured for forced draft, induced draft, and recirculation fans and the associated ductworks. The data analysis indicated that force draft fans in both plants had relatively low variations in pressure amplitude, and induced draft fans had significant levels of pressure variation. The analysis of data for one plant indicated the existence of conditions in the recirculation loop at low load levels in which a component of fan rotating stall noise matched in frequency and was amplified by a duct acoustic natural mode of vibration. DOE

N81-14479# Washington Scientific Marketing, Inc., Washington, D.C.

PROCEEDINGS OF THE DEPEARTMENT OF ENERGY ADVANCED GAS TURBINE CENTRAL POWER SYSTEMS WORKSHOP

S. DAngelo, ed. 1980 196 p refs

(Contract DE-AC01-76-ET-10354)

(CONF-8004103) Avail: NTIS HC A09/MF A01

Technology for increasing the use of coal in central station electric power generation in an economical and environmentally acceptable manner is discussed. The two major research and development areas are the Open Cycle Gas Turbine System and the Closed Cycle Gas Turbine System. The following topics are examined: technical considerations of the Open Cycle and of the Closed Cycle Gas Turbine program; commercialization of both systems; and regulatory impacts on the development of both systems. DOE

N81-14480# Gould, Inc., Rolling Meadows, Ill.

RESEARCH, DEVELOPMENT AND DEMONSTRATION OF NICKEL-ZINC BATTERIES FOR ELECTRIC VEHICLE PROPULSION Annual Report, 1 Jul. 1978 - 31 Aug. 1979

Jun. 1980 108 p

(Contract W-31-109-eng-38)

(ANL/OEPM-79-11; AR-2) Avail: NTIS HC A06/MF A01

The feasibility of the nickel zinc battery for electric vehicle propulsion is discussed. The program is divided into seven distinct but highly interactive tasks collectively aimed at the development and commercialization of nickel zinc technology. These basic technical tasks are separator development, electrode development, product design and analysis, cell/module battery testing, process development, pilot manufacturing, and thermal manufacturing, and thermal management. Significant progress has been made in the understanding of separator failure mechanisms, and a generic category of materials has been specified for the 300+ deep discharge applications. Shape change has been reduced significantly. Progress in the area of thermal management was significant, with the development of a model that accurately represents heat generation and rejection rates during battery operation. DOE

N81-14481# Midwest Research Inst., Golden, Colo.

COMMUNITY ENERGY SELF-RELIANCE

Jul. 1980 568 p refs Presented at Community Renewable Energy Sys. Conf., Boulder, 20 Aug. 1979

(Contract DE-AC02-77CH-00178)

(SERI/CP-354-421; CONF-790864) Avail: NTIS HC A24/MF A01

Goals of a workshop/conference on community renewable energy systems are: (1) to encourage decentralization in attacking energy problems, (2) to show how renewable energy can meet community goals, (3) to present examples of successful projects, (4) to discuss the planning and management of renewable energy systems, (5) to identify sources of financial support, (6) to share legal strategies, and (7) to examine utility roles. DOE

N81-14482# Pennsylvania State Univ., University Park. Materials Research Labs.

CONTROLLED CADMIUM TELLURIDE THIN FILMS FOR SOLAR CELLS APPLICATIONS Quarterly Report, 1 Jun. - 1 Sep. 1980

M. B. Das Sep. 1980 14 p refs

(Contract DE-AC02-77CH-00178)

(SERI/PR-9131-1-T1; QR-1) Avail: NTIS HC A02/MF A01

Efforts to set up a new ion beam sputtering system that would replace an existing R.F. sputtering system for the fabrication of doped CdTe thin films for solar cell applications are described. Difficulties were confronted in achieving the total control of the system which prevented the deposition of films with satisfactory quality. Frequency dependent capacitance and conductance measurements were conducted on Schottky barrier diodes prepared from earlier deposited films. Results indicate presence of possible deep levels with distributed energy that limited the photovoltaic performance of these samples reducing carrier lifetime. DOE

N81-14483# Midwest Research Inst., Golden, Colo.

QUALITY-ASSURANCE NEEDS AND GOALS IN SOLAR ENERGY CONVERSION

Gordon E. Gross Jul. 1980 9 p refs Presented at the 7th Ann. Natl. Energy Div. Conf., Houston, Tex., 29 Sep. 1980

(Contracts DE-AC02-77CH-00178; EG-77-C-01-4042)

(SERI/TP-641-773; CONF-800927-2) Avail: NTIS HC A02/MF A01

A discussion of the status of quality assurance activities in solar energy conversion technologies and of the needs for further efforts in this area is presented. The importance of reliability and quality assurance activities to various end users is briefly discussed. Some details of such activities in wind, active heating and cooling, and photovoltaic technologies are given. Suggestions for an inegrated reliability, quality assurance program are presented and their importance to the growth of solar energy application is discussed. DOE

N81-14484# General Electric Co., Schenectady, N. Y. Corporate Research and Development Dept.

REGENERATIVE FLYWHEEL ENERGY STORAGE SYSTEM. VOLUME 1: EXECUTIVE SUMMARY Final Report

27 Jun. 1980 37 p 3 Vol.

(Contract W-7405-eng-48)

(UCRL-15290-Vol-1; SRD-79-148-1-Vol-1) Avail: NTIS HC A03/MF A01

The development, fabrication, and test of a regenerative flywheel energy storage and recovery system for a battery/flywheel electric vehicle of the 3000 pound class are described. The vehicle propulsion system was simulated on a digital computer in order to determine the optimum system operating strategies and to establish a calculated range improvement over a nonregenerative, all electric vehicle. Fabrication of the inductor motor, the flywheel, the power conditioner, and the system control are described. Test results of the system operating over the SAE J227a Schedule D driving cycle are given and are compared to the calculated value. The flywheel energy storage system consists of a solid rotor, synchronous, inductor type, flywheel drive machine electrically coupled to a dc battery electric propulsion system through a load commutated inverter. The motor/alternator unit is coupled mechanically to a small steel flywheel which provides a portion of the vehicle's accelerating energy and regenerates the vehicle's braking energy. DOE

N81-14485# General Electric Co., Schenectady, N. Y. Corporate Research and Development Dept.

REGENERATIVE FLYWHEEL STORAGE SYSTEM, VOLUME 2 Final Report

27 Jun. 1980 226 p refs

(Contract W-7405-eng-48)

(UCRL-15290-Vol-2; SRD-79-148-2) Avail: NTIS HC A11/MF A01

A vehicle propulsion system was simulated on a digital computer in order to determine the optimum system operating strategies and to establish a calculated range improvement over a nonregenerative, all electric vehicle. Fabrication of the inductor motor, the flywheel, the power conditioner, and the system control are described. Test results of the system operating over the SAE J227a Schedule D driving cycle are given and are compared to the calculated value. The flywheel energy storage system consists of a solid rotor, synchronous, inductor type, flywheel drive machine electrically coupled to a dc battery electric propulsion system through a load commutated inverter. The

motor/alternator unit is coupled mechanically to a small steel flywheel which provides a portion of the vehicle's accelerating energy and regenerates the vehicle's braking energy. DOE

N81-14486# General Electric Co., Schenectady, N. Y. Corporate Research and Development Dept.
REGENERATIVE FLYWHEEL ENERGY STORAGE SYSTEM. VOLUME 3: LIFE CYCLE AND COST-BENEFIT ANALYSIS OF A BATTERY-FLYWHEEL ELECTRIC CAR
27 Jun. 1980 194 p refs
(Contract W-7405-eng-48)
(UCRL-15290-Vol-3; SRD-79-148-3) Avail: NTIS HC A09/MF A01

Fabrication of the inductor motor, the flywheel, the power conditioner, and the system control is described. Test results of the system operating over the SAE j227a Schedule D driving cycle are given and are compared to the calculated value. The flywheel energy storage system consists of a solid rotor, synchronous, inductor-type, flywheel drive machine electrically coupled to a dc battery electric propulsion system through a load-commutated inverter. The motor/alernator unit is coupled mechanically to a small steel flywheel which provides a portion of the vehicle's accelerating energy and regenerates the vehicle's braking energy. Laboratory simulation of the electric vehicle propulsion system included a 108 volt, lead-acid battery bank and a separately excited dc propulsion motor coupled to a flywheel and generator which simulate the vehicle's inertia and losses. DOE

N81-14487# California Univ., Livermore.
SIX KILOWATT, RESIDENTIAL PHOTOVOLTAIC POWER SYSTEMS STUDY; DESIGN, PERFORMANCE, ECONOMICS, MARKET POTENTIAL
Larry D. Partain 4 Aug. 1980 58 p refs
(Contract W-7405-eng-48)
(UCID-18776) Avail: NTIS HC A04/MF A01

A cost and performance analysis is presented for a solar cell electric system that can provide 70% of the electric power to a home in a California-like climate. Both a battery storage and no-storage configuration with a six kilowatt, peak power, solar array were considered, including batteries, for a 15 kWh per day average energy use that equals that of an average household in Northern California. For the promising, no-storage home system the uncertainties in important parameter values are too large to allow definitive assessment until better characterizations have been made. The political and policy decisions that can have a strong influence were assessed and quantified. The effects of tax credits, utility buyback, and proper home construction were considered. Potential markets in the hundreds of millions of dollars per year range that involve on the order of one million peak kilowatts of solar cells per year were estimated. DOE

N81-14488# Little (Arthur D.), Inc., Cambridge, Mass.
DISTRIBUTED ENERGY SYSTEMS: A REVIEW OF RELATED TECHNOLOGIES
Nov. 1979 558 p refs
(Contract EX-76-C-01-3871)
(DOE/PE-03871/01) Avail: NTIS HC A25/MF A01

An assessment of energy producing systems is presented. A balanced description of various energy technologies along with expectations for their growth and problems that may be encountered are also included. Estimates of equipment capital and operating costs are also provided. L.F.M.

N81-14489# Aerospace Corp., El Segundo, Calif.
SOLAR THERMAL POWER SYSTEMS Summary Report, Apr. 1973 - Nov. 1979
Leon R. Bush Jun. 1980 153 p refs Sponsored in part by NSF and ERDA
(Contracts DE-A101-79ET-21036; F04701-79-C-0080)
(DOE/CS-21036/01) Avail: NTIS HC A08/MF A01

Potential solar energy users and other interested organizations are provided a summary of solar thermal power methodology, assumptions, and major findings. Extensive references are provided to permit pursuit of detailed technical results and determine the content and availability of computer programs and data bases that were generated. L.F.M.

N81-14490# Colorado State Univ., Fort Collins. Solar Energy Applications Lab.
PERFORMANCE EVALUATION OF A STATE-OF-THE-ART SOLAR AIR-HEATING SYSTEM WITH AUXILIARY HEAT PUMP Annual Report, 1 Oct. 1978 - 30 Sep. 1979
Jan. 1980 222 p refs
(Contract DE-AC02-79CS-30122)
(DOE/CS-30122/4) Avail: NTIS HC A10/MF A01

The system in Solar House 2 consists of 57.9 sq. m. of Solaron Series 300 Collectors, 10.3 cu. m. of pebble bed storage, domestic water preheating capability and a Carrier air-to-air heat pump as an auxiliary heater. Although the control subsystem was specially constructed to facilitate experimental changes and data reduction, the balance of the solar system was assembled with off-the-shelf components. Since all components of the system are commercially available the system is considered to be a state of the art solar air-heating system. The system design is one that is recommended for residential and small office buildings. Author

N81-14491*# Alabama Univ. in Huntsville. Environmental and Energy Center.
SPS ENERGY CONVERSION POWER MANAGEMENT WORKSHOP Final Report
Jun. 1980 98 p Workshop held in Huntsville, Ala., 5-7 Feb. 1980
(Contracts NAS8-33132; DE-AS01-78CS-34218)
(NASA-CR-163840; DOE/CS-34218/T1) Avail: NTIS HC A05/MF A01 CSCL 10A

Energy technology concerning photovoltaic conversion, solar thermal conversion systems, and electrical power distribution processing is discussed. The manufacturing processes involving solar cells and solar array production are summarized. Resource issues concerning gallium arsenides and silicon alternatives are reported. Collector structures for solar construction are described and estimates in their service life, failure rates, and capabilities are presented. Theories of advanced thermal power cycles are summarized. Power distribution system configurations and processing components are presented. T.M.

N81-14492# Battelle Columbus Labs., Ohio.
DEVELOPMENT OF A LOW-COST BLACK-LIQUID SOLAR COLLECTOR, PHASE 2 Semiannual Report, 1 Mar. - 31 Aug. 1980
D. K. Landstrom, S. G. Talbert, and V. D. McGinniss 30 Sep. 1980 15 p refs
(Contract DE-AC04-79CS-30171)
(DOE/CS-30171/2A; SAR-2) Avail: NTIS HC A02/MF A01

Research efforts were directed toward (1) evaluating the long-term durability of various plastic materials and solar collector designs, (2) obtaining sufficient outdoor performance data to design a full-scale demonstration of a black-liquid solar collector for a commercial application, (3) working closely with a company willing to commericalize black liquid plastic collectors, and (4) incorporating improved black liquids with the identified plastic collector designs. Besides conducting indoor weathering tests of various plastic materials, two outdoor automated test facilities were operated. Author

N81-14493# National Technical Information Service, Springfield, Va.
SOLAR PONDS. CITATIONS FROM THE ENGINEERING INDEX DATA BASE Progress Report, 1970 - Jul. 1980
Audrey S. Hundemann Aug. 1980 49 p Supersedes NTIS/PS-79/0925 and NTIS/PS-78/0837 Updates NTIS/PS-77/0459
(PB80-814452; NTIS/PS-79/0925; NTIS/PS-78/0837) Copyright. Avail: NTIS HC $30.00/MF $30.00 CSCL 10A

Design and use of solar ponds for industrial process heat production and in space heating applications are discussed in approximately 44 citations. A few abstracts pertain to solar pond stability and evaporation rates. GRA

N81-14494# National Technical Information Service, Springfield, Va.
SOLAR PONDS. CITATIONS FROM THE NTIS DATA BASE Progress Report, 1976 - Jul. 1980
Audrey S. Hundemann Aug. 1980 54 p Supersedes

NTIS/PS-79/0924 and NTIS/PS-78/0836 Updates NTIS/PS-77/0458
(PB80-814460; NTIS/PS-79/0924; NTIS/PS-78/0836) Copyright. Avail: NTIS HC $30.00/MF $30.00 CSCL 10A

Federally funded research on the design, performance, and use of solar ponds is discussed on these. Topic areas cover the use of solar ponds in industrial process heat production, roof ponds for passive solar buildings, and solar ponds use in the production of biomass for renewable fuels. GRA

N81-14495# National Technical Information Service, Springfield, Va.
GEOTHERMAL ENERGY. CITATIONS FROM THE ENGINEERING INDEX DATA BASE Progress Report, Aug. 1978 - Jul. 1980
Audrey S. Hundemann Sep. 1980 277 p Supersedes NTIS/PS-79/0819 and NTIS/PS-78/0667
(PB80-814692; NTIS/PS-79/0819; NTIS/PS-78/0667) Copyright. Avail: NTIS HC $30.00/MF $30.00 CSCL 10A

Citations from worldwide literature on geothermal energy conversion, feasibility, development, and cost estimates are presented. Studies on geothermal exploration, drilling technology, fluid flow, convection, thermodynamics, heat extraction, and electric power plants are covered. Equipment, corrosion, reservoir engineering, and remote sensing are included. This updated bibliography contains 143 citations, all of which are new entries to the previous edition. GRA

N81-14496# National Technical Information Service, Springfield, Va.
GEOTHERMAL ENERGY. CITATIONS FROM THE ENGINEERING INDEX DATA BASE Progress Report, Aug. 1978 - Jul. 1979
Audrey S. Hundemann Sep. 1980 148 p
(PB80-814684) Copyright. Avail: NTIS HC $30.00/MF $30.00 CSCL 10A

Geothermal energy conversion, feasibility, development and cost estimates are presented in approximately 143 citations. Geothermal exploration, drilling technology, fluid flow, convection, thermodynamics, heat extraction, and electric power plants are covered. Equipment, corrosion, reservoir engineering, and remote sensing are included. GRA

N81-14497# National Technical Information Service, Springfield, Va.
GEOTHERMAL ENERGY: TECHNOLOGY AND GENERAL STUDIES. CITATIONS FROM THE NTIS DATA BASE Progress Report, 1978 - Jul. 1980
Audrey S. Hundemann Sep. 1980 200 p Supersedes NTIS/PS-79/0817; NTIS/PS-78/0666
(PB80-814676; NTIS/PS-79/0817; NTIS/PS-78/0666) Copyright. Avail: NTIS HC $30.00/MF $30.00 CSCL 10A

This bibliography contains 311 citations of Government-sponsored research on geothermal energy conversion, power plants, heat extraction, and space heating. Studies on fluid flow, heat transfer, rock fracturing, environmental impacts, pressure, and reservoir engineering are included. Reports on economics, legislation, technology assessment, comparative evaluation with other energy sources, Government policies, and planning are also cited. GRA

N81-14498# Applied Physics Lab., Johns Hopkins Univ., Laurel, Md.
GEOTHERMAL ENERGY DEVELOPMENT IN THE EASTERN UNITED STATES GEOTHERMAL SPACE HEATING - NAVAL AIR REWORK FACILITY, NORFOLK, VIRGINIA
F. K. Hill and R. W. Henderson 10 Jun. 1980 43 p refs (Contract EX-76-A-36-1008)
(PB80-217490; JHU/APL/QM-80-102) Avail: NTIS HC A03/MF A01 CSCL 13A

The technical and economic feasibility of using geothermal energy for space heating the Naval Air Rework Facility (NARF) electronic integration hangar was evaluated. The warm water output from a single well was used in several modes: to heat via a floor radiation system or via heat pumps, with and without a ground water reservoir to store heat in off hours. GRA

N81-14499# Applied Physics Lab., Johns Hopkins Univ., Laurel, Md.
GEOTHERMAL ENERGY DEVELOPMENT IN THE EASTERN UNITED STATES. GEOTHERMAL SPACE HEATING, PITTSVILLE MIDDLE/ELEMENTARY SCHOOL, PITTSVILLE, MARYLAND Technical Assistance Report No. 4
Roy vonBriesen and Kwang Yu Jun. 1980 35 p (Contracts EX-76-A-36-1008; DE-AI01-79ET-27025)
(PB80-221088; JHU/APL/QM-80-101) Avail: NTIS HC A03/MF A01 CSCL 13A

The old school building was undergoing a major rebuilding program, while the elementary school wing was just to have insulation added. Two cases were examined; both provided a production and reinjection well. One case evaluated a geothermal heating system sized for the new construction of the main school building. The other case examined retrofitting the elementary school wing existing heating system combined with the new construction of the main school building. GRA

N81-14500# National Oceanic and Atmospheric Administration, Rockville, Md. Office of Ocean Engineering.
ALTERNATIVE ENERGY SOURCES SESSION OCEAN THERMAL ENERGY CONVERSION: TECHNOLOGY DEVELOPMENT
William E. Richards and Joseph R. Vadus Mar. 1980 30 p refs Presented at the Oceanology Intern. '80 Conf., Brighton, England, 7 Mar. 1980 Sponsored in part by DOE, Washington, D.C.
(PB80-218159; NOAA-TR-OOE-9; NOAA-80071704) Avail: NTIS HC A03/MF A01 CSCL 10B

Four ocean-energy technologies with significant promise are explored: ocean thermal energy conversion; wave power; ocean currents; and salinity gradients. The major funding emphasis has been in OTEC. Technical developments, accomplishments and major findings, remaining problems, and proposed plans for the future are discussed. GRA

N81-14501# National Bureau of Standards, Washington, D.C. Office of Testing Lab.
INFORMATION AND GUIDELINES FOR A PROPOSED LABORATORY ACCREDITATION AND PRODUCT CERTIFICATION PROGRAM FOR PHOTOVOLTAIC ENERGY CONVERSION SYSTEMS
Douglas B. Thomas Aug. 1980 36 p refs
(PB80-217615; NBSIR-80-2028) Avail: NTIS HC A03/MF A01 CSCL 10B

An overview of the advantages and disadvantages of laboratory accreditation and product certification including economic factors that should be considered for such programs is presented. Detailed information is also provided on the two national programs for accrediting laboratories, the Department of Commerce National Voluntary Laboratory Accreditation Program and the American Association for Laboratory Accreditation. Information on the California and Florida state programs for laboratory accreditation and product certification of solar collector systems is given as examples of programs that were in operation for several years. GRA

N81-14156*# European Space Research and Technology Center, Noordwijk (Netherlands).
OUTGASSING TESTS ON IRAS SOLAR PANEL SAMPLES
G. Premat, A. Zwaal, and N. H. Pennings (Fokker Space Div., Schiphol, Netherlands) *In* NASA. Johnson Space Center The 11th Space Simulation Conf. 1980 p 227-242 (For primary document see N81-14138 05-31)
Avail: NTIS HC A19/MF A01 CSCL 10A

N81-14164*# Industrieanlagen-Betriebsgesellschaft m.b.H., Ottobrunn (West Germany). Space Div.
SOLAR PANEL THERMAL CYCLING TESTING BY SOLAR SIMULATION AND INFRARED RADIATION METHODS
Hubert E. Nuss *In* NASA. Johnson Space Center The 11th Space Simulation Conf. 1980 p 318-330 refs (For primary document see N81-14138 05-31)
Avail: NTIS HC A19/MF A01 CSCL 10A

45 ENVIRONMENT POLLUTION

Includes air, noise, thermal and water pollution; environment monitoring; and contamination control.

N81-14502# Council on Environmental Quality, Washington, D.C.
GLOBAL ENERGY FUTURES AND THE CARBON DIOXIDE PROBLEM
Jan. 1981 94 p refs
Avail: NTIS HC A05/MF A01

The continued rise in atmospheric carbon dioxide concentration poses potentially severe long term risks to the global climate and to the biological systems that depend on it. The regional and socioeconomic impacts of long range CO2 induced global warming were examined. The potential risks from even moderate increases in the burning of fossil fuels over the coming decades are discussed. Recommendations for dealing with the CO2 problem in a global context are presented. T.M.

N81-14503*# California Univ., Santa Barbara. Dept. of Environmental Studies.
LIFE FROM A PLANTARY PERSPECTIVE: FUNDAMENTAL ISSUES IN GLOBAL ECOLOGY Final Report
Daniel B. Botkin 14 Nov. 1980 52 p refs
(Grant NASw-3392)
Avail: NTIS HC A04/MF A01 CSCL 13B

Twenty-three scientists from diverse disciplines met for one week at the University of California, Santa Barbara to discuss life from a planetary perspective. The scientists represented the major disciplines concerned with the Earth's biota, oceans, atmosphere and sediments, including geochemistry, atmospheric chemistry, chemical oceanography, limnology, forestry, terrestrial ecology, microbiology, biophysics, geography and remote sensing as well as mathematics. These twenty-three scientists met to discuss whether there was, at this time, a set of scientific issues concerning life and the entire Earth as a single unit, to set down the major tractable issues, and to suggest a set of activities that would promote the study of the issues identified. Their conclusions are summarized. Author

N81-14504*# Systems Applications, Inc., San Rafael, Calif.
ASSESSMENT OF THE VISIBILITY IMPAIRMENT CAUSED BY THE EMISSIONS FROM THE PROPOSED POWER PLANT AT BORON, CALIFORNIA Final Report
R. W. Bergstrom, J. R. Doyle, C. D. Johnson, H. Y. Holman, and M. A. Wojcik Dec. 1980 161 p refs
(Contract NAS4-2745)
(NASA-CR-163103; SAI-181-EF80-156; H-1143) Avail: NTIS HC A08/MF A01 CSCL 13B

The current atmospheric conditions and visibility were modeled, and the effect of the power plant effluent was then added to determine its influence upon the prevailing visibility; the actual reduction in visibility being a function of meteorological conditions and observer-plume-target geometry. In the cases investigated, the perceptibility of a target was reduced by a minimum of 10 percent and a maximum of 100 percent. This significant visual impact would occur 40 days per year in the Edwards area with meteorological conditions such as to cause some visual impact 80 days per year. Author

N81-14505# National Physical Lab., Teddington (England). Div. of Quantum Metrology.
MONITORING POLLUTANT GASES FROM SPACE USING PASSIVE MICROWAVE TECHNIQUES
J. E. Harries Feb. 1980 51 p refs
(NPL-QU-59) Avail: NTIS HC A04/MF A01

The application of passive microwave sensing techniques from space to the study of pollutant concentrations in the lowest layers of the troposphere is discussed. The essentials of radiative transfer theory are introduced and the spectroscopy of the atmosphere at millimeter wavelengths, the intensity of pollutant spectral lines and, the problem of detectability of these lines against the background radiation emitted by the Earth's surface are treated. It is shown that, despite the intrinsic power of microwave techniques, a number of significant problems exist, including the extreme weakness of many of the pollutant lines (making ultra-low receiver noise levels an important goal); uncertainties in the nature of the continuum absorption at these wavelengths; and the effects of heavy rain and thick clouds. Some suggestions for further work are given. A.R.H.

N81-14506# Sandia Labs., Albuquerque, N. Mex. Dept. of Engineering Analysis.
DOE/DOD ENVIRONMENTAL DATA BANK INDEX
Clarence A. Davidson, Jerry T. Foley, Clifford F. Magnuson, and Carlton A. Scott (Sandia Labs., Livermore, Calif.) Dec. 1979 528 p Supersedes SAND-74-0255B Sponsored by DOE
(SAND-79-2130; SAND-74-0255B) Avail: NTIS HC A23/MF A01

In an effort to determine the environment to which the equipment designed by Sandia Laboratories will be exposed, a data bank of environmental information is being maintained. Measured quantities resulting from field tests or actual use are continually being summarized to establish envelopes of inputs and responses. The material is being collected, microfilmed, and filed under 14 basic categories of environment. By consulting this data bank, users have at their immediate disposal numerical definition of the environments to aid in establishing design requirements and test levels. Access to the information held in the data bank is not limited to Sandia personnel. DOE

N81-14507# Institute for Telecommunication Sciences and Aeronomy, Boulder, Colo.
ENVIRONMENTAL ASSESSMENT FOR THE SATELLITE POWER SYSTEM. CONCEPT DEVELOPMENT AND EVALUATION PROGRAM: EFFECTS OF IONOSPHERIC HEATING ON TELECOMMUNICATIONS
Aug. 1980 97 p refs
(Contract DE-A102-79CH-10003)
(DOE/ER-10003/T2) Avail: NTIS HC A05/MF A01 CSCL 13B

A program of national scope involving Government laboratories, industrial resources, and university personnel, was formulated. The effect of SPS operation upon the ionosphere was simulated by use of existing ground-based high-power transmitter facilities and the necessary formulations to permit the extrapolation of the simulations to the SPS operational scenario were developed. The programs of research and exploratory development undertaken for this assessment were grouped into three categories: simulation of telecommunication impacts, experimental studies of the physics of heating the ionosphere by radio waves, and theoretical studies. Author

N81-14508*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
ENVIRONMENTAL IMPACTS OF THE SATELLITE POWER SYSTEM (SPS) ON THE MIDDLE ATMOSPHERE
Oct. 1980 39 p refs
(Contract DE-AI01-79ER-10035)
(NASA-TM-82228; DOE/ER-10035/01) Avail: NTIS HC A03/MF A01 CSCL 13B

The heavy lift launch vehicles (HLLV) proposed for use in constructing satellite power systems (SPS) would deposit various contaminants in the middle atmosphere, contaminants that would conceivable have adverse effects on climate and upper air structure. These contaminants consist of the major constituents of water vapor, hydrogen, carbon dioxide, and carbon monoxide, and the minor constituents of sulfur dioxide and nitric oxide in the rocket effluent, as well as nitric oxide formed during reentry. To assess the magnitudes of the effects, new models or modified existing models were constructed. Author

N81-14509# Michigan State Univ., East Lansing. Dept. of Physics.
PERFORMANCE CHARACTERISTICS OF LARGE APERTURE, TEN-CELL, ATMOSPHERIC PRESSURE ISOBUTANE CERENKOV COUNTERS
J. Hylen, Z. MingMa, A. Jawahery (Tufts Univ., Medford, Mass.), T. Maruyama (Tufts Univ., Medford, Mass.), R. Milburn (Tufts Univ., Medford, Mass.), and R. Thornton (Tufts Univ., Medford, Mass.) 24 May 1980 25 p refs Sponsored by DOE
(DOE/ER-14529/1) Avail: NTIS HC A02/MF A01

The counters were designed and constructed for a Stanford Linear Accelerator Center streamer chamber experiment. The

rejection efficiencies for a 9 GeV/c negative pi were measured to be 99.848 + or - .006 percent and 99.717 + or - .008 percent for the two counters. The design details are discussed. Author

N81-14510# Minnesota Univ., Minneapolis.
THE CHEMICAL COMPOSITION OF ATMOSPHERIC PRECIPITATION IN MINNESOTA AND NORTH DAKOTA
Final Report, 1 Jul. 1977 - 30 Jun. 1980
Eville Gorham Jul. 1980 31 p refs
(Contract DE-AC02-77EV-04327)
(DOE/EV-04327/1) Avail: NTIS HC A03/MF A01

Precipitation chemistry in central North America appears to be controlled by interaction between soil derived alkaline dust and gaseous NH3 from the cultivated prairie and anthropogenic acid aerosols from the urban industrial Lower Great Lakes Ohio Valley region. Analyses of major ions and trace metals in precipitation event and snow core samples along a 600 km transect from the North Dakota prairie to the northeastern Minnesota forest indicate that loadings and concentrations of soil derived materials decrease with increasing distance from the prairie. Acidity is highest in the east and decreases to the west. Sulfate has natural sources in the west and anthropogenic sources in the east; its concentration was least at sites in the middle of the transect. Acidity increased and inputs of soil derived elements decreased during winter when snow and freezing temperatures reduced alkaline influxes to the region. S.F.

N81-14511# Brookings Institution, Washington, D. C.
MITIGATING STRATEGIES FOR CO2 PROBLEMS
Lester B. Lave 1980 18 p refs Sponsored by DOE
(DOE/EV-10281/T2) Avail: NTIS HC A02/MF A01

The implications of carbon dioxide emissions on a global basis was studied. Major concerns included the amount of fossil fuel that will be burned each year, the physical effects on the cryosphere and oceans for any concentration of atmospheric CO2, the direct effect of the changes in climate and ocean dynamics on biota, and the extent to which human behavior and institutions can and will mitigate the adverse effects of increased CO2 concentration. T.M.

N81-14512# Oak Ridge National Lab., Tenn. Energy Div.
THE ENVIRONMENTAL ASSESSMENT OF SYNFUELS PROJECTS
C. R. Boston 24 Sep. 1980 9 p refs Presented to the Joint Legislative Study Subcomm. on Synfuels, Senate Energy and Natural Resources Comm., Knoxville, Tenn., 24 Sep. 1980
(Contract W-7405-eng-26)
(DOE/TIC-11286) Avail: NTIS HC A02/MF A01

Environmental assessments of synfuels demonstration projects including the preparation of environmental impact statements for all six of DOE's demonstration plants are presented. The synfuels technologies include high Btu gasification, medium Btu gasification and liquefaction. Author

N81-14513# Oak Ridge National Lab., Tenn. Energy Div.
ANALYTICAL MODEL FOR A VERTICAL BUOYANT JET
D. W. Lee Oct. 1980 52 p refs
(Contract W-7405-eng-26)
(ORNL/TM-7140) Avail: NTIS HC A04/MF A01

An analytical model for a round and two dimensional turbulent buoyant jet which is discharged vertically into a stagnant ambient is developed. The buoyant jet is considered to have three separate zone models which are matched to form a complete solution. The velocity field is determined for the entire jet and plume regions by the use of an eddy viscosity which varies along the axis of the jet. The centerline decay of buoyancy is determined throughout and the results are compared to existing numerical codes. The model is applied to the disposal of carbon dioxide enriched seawater. The results can be used to provide design information for minimizing or maximizing the dilution of a discharge by the receiving environment. DOE

N81-14514# SRI International Corp., Menlo Park, Calif. Atmospheric Science Center.
DEVELOPMENT OF AN AIRBORNE LIDAR FOR CHARACTERIZING PARTICLE DISTRIBUTION IN THE ATMOSPHERE
Final Report
E. E. Uthe, W. L. Jimison, and N. B. Nielsen Sep. 1980 45 p refs
(EPRI Proj. 1308-2)
(EPRI-EA-1538) Avail: NTIS HC A03/MF A01

The ALPHA-1 (Airborne Lidar Plume and Haze Analyzer) was designed to observe smoke plume and atmospheric boundary layer particles over large areas. A data processing system was designed for both real time facsimile (grayscale) display and magnetic tape recording. Multiple microcomputers were used to optimize processing capabilities within the power weight and size constraints of medium sized twin engine aircraft. A one week field program was conducted to evaluate ALPHA-1 performance and reliability. The system successfully observed boundary layer structure over the Los Angeles area and the downwind structure of particulate plumes from power plants. The data show the importance of terrain features in establishing particle distributions over urban areas and downwind of large power plants. DOE

N81-14515# Argonne National Lab., Ill.
OVERVIEW OF THE ENVIRONMENTAL CONCERNS OF COAL TRANSPORTATION
K. Bertram, P. Dauzvardis, L. Fradkin, and T. Surles Feb. 1980 75 p refs
(Contract W-31-109-eng-38)
(ANL/EES/TM-99) Avail: NTIS HC A04/MF A01

More than 30 environmental concerns were analyzed for the transportation of coal by rail, roads (truck), high voltage transmission lines, from mine-mouth generating plants to distribution networks), coal slurry pipelines, and barges. The following criteria were used to identify these problem: (1) real physical environmental impacts for which control technologies must be developed, or regulation made effective where control technologies presently exist; (2) the level of impact is uncertain, although the potential impact may be moderate to high; (3) the concerns identified by the first two criteria are specific to or exacerbated by coal transportation. The significant environmental problems identified as a result of this study are: (1) rail transport; (2) coal haul roads; (3) high voltage transmission lines; (4) slurry pipelines; and (5) barge transport. DOE

N81-14516# Institute of Ecology, Indianapolis, Ind.
ROLE OF ORGANIC SOILS IN THE WORLD CARBON: PROBLEM ANALYSIS AND RESEARCH NEEDS
Thomas V. Armentano 1979 43 p refs Workshop held in Indianapolis, 7-8 May 1979 Sponsored by DOE
(DOE/EV-10040/2) Avail: NTIS HC A03/MF A01

Organic soils were found to be very important in the overall carbon budget. Histosols and Gleysols, the major organic soil deposits of the world, normally sequester organic carbon fixed by plants. They may be releasing enough carbon to account for nearly 10% of the annual rise in atmospheric content of CO2. Major organic soil data inadequacies exist for total area, pool size, distribution, and depth of organic soils, amount of soil carbon deposits, amount of annual carbon release, extent of drainage activities, and contribution of temperate zone organic soils to the rise of atmospheric carbon in the 19th centuries. Programs to reduce these uncertainties are presented. T.M.

N81-14517# Stanford Univ., Calif. Dept. of Statistics.
MISSPECIFICATION OF TREND IN SPATIAL RANDOM FUNCTION INTERPOLATION WITH APPLICATION TO OXIDANT MAPPING
Ray Faith and Ruth Sheshinski (Hebrew Univ. of Jerusalem, Israel) Sep. 1979 49 p refs Sponsored in part by SIAM Inst. for Mathematics and Society, the Rockefeller Foundation, Sloane Foundation, EPA and NSF
(Contract EY-76-S-02-2874)
(DOE/EV-02874/59; SU-TR-28) Avail: NTIS HC A03/MF A01

In epidemiological studies of the effects of air pollution, it is desirable to obtain estimates of the exposure to various pollutants of persons living throughout a geographical region under study. Estimators based on a correctly and incorrectly specified constant mean were compared with estimators based on an unspecified constant mean. The ratios of the mean squared errors decreases with decreasing correlation between observations, and are, in general, very close to one. Estimation done with a

specified linear trend function is compared to estimation with an unspecified linear trend function. For interpolation, in general, the MSE's tend to be close except for high underlying correlation models. For extrapolation, the MSE values can be very different. A biased partially constrained estimator was compared to a fully constrained universally unbiased estimator in the presence of a linear trend. In general, the biased and unbiased estimators have similar performance, except for very steep linear slopes of the trend. Author

N81-14518# Technology Service Corp., Santa Monica, Calif.
VISIBILITY IN CALIFORNIA Final Report, Jul. 1978 - Jul. 1980
John Trijonis (Santa Fe Research Corp., N. Mex.) Jul. 1980 240 p refs
(Contract ARB-A7-181-30)
(PB80-216765; TSC-PD-B612-3; ARB-R-80/122) Avail: NTIS HC A11/MF A01 CSCL 13B

A comprehensive study is conducted of visibility in California using prevailing visibility measurements at 67 weather stations conjunction with data on particulate concentrations and meteorology. GRA

N81-14519# Radian Corp., Austin, Tex.
TRACE METALS AND STATIONARY CONVENTIONAL COMBUSTION PROCESSES. VOLUME 1: TECHNICAL REPORT Final Report, May 1979 - May 1980
Larry O. Edwards, Charles A. Muela, Ralph E. Sawyer, Carol May Thompson, Damon H. Williams, and R. Dean Delleney Aug. 1980 454 p refs
(Contract EPA-68-02-2608)
(PB80-216161; RAD-80-202-187-54-23; EPA-600/7-80-155A; IERL-RTP-1079) Avail: NTIS HC A20/MF A01 CSCL 13B

A survey reporting the trace metal concentration in combustible fuels, identified coal as the fuel of most concern; generally, trace metal levels in coal are similar to their crustal abundances. It reviewed conventional combustion technology. It discusses trace metal flows and partitioning around various types of boilers and pollution control devices, and reports data from cited studies. In addition to coal, the report gives data for oil, municipal refuse, and wood. It also covers emissions to air, water, and soil, including trace metal leaching. It documents the health and environmental effects of trace metals. GRA

N81-14520# Radian Corp., Austin, Tex.
TRACE METALS AND STATIONARY CONVENTIONAL COMBUSTION PROCESSES. VOLUME 2: BIBLIOGRAPHY Final Report, May 1979 - May 1980
Larry O. Edwards, Charles A. Muela, Ralph E. Sawyer, Carol May Thompson, Damon H. Williams, and R. Dean Delleney Aug. 1980 107 p
(Contract EPA-68-02-2608)
(PB80-216179; RAD-80-202-187-54-23; EPA-600/7-80-155B; IERL-RTP-1080) Avail: NTIS HC A06/MF A01 CSCL 13B

The report gives results of a search of U.S. literature to identify published information about trace metals and stationary conventional combustion processes (SCCPs). It summarizes what has been published about ambient trace metals in air, water, and soils, and reviews conventional combustion technology. It discusses trace metal flows and partitioning around various types of boilers and pollution control devices, and reports data from cited studies. In addition to coal, the report gives data for oil, municipal refuse, and wood. It also covers emissions to air, water, and soil, including trace metal leaching. It documents the health and environmental effects of trace metals. Where possible, it assesses, specific contributions from SCCPs. It covers environmental transport systems, as well as special problems associated with radioactive metals and SCCPs. GRA

N81-14521# Monsanto Research Corp., Dayton, Ohio.
AN EVALUATION OF EMISSION FACTORS FOR WASTE-TO-ENERGY SYSTEMS Final Report, Nov. 1978 - 1979
K. M. Tackett, T. R. Balckwood, D. L. Harris, and K. M. Tackett Jul. 1980 53 p refs
(Contract EPA-68-03-2550)
(PB80-226665; MRC-DA-921; EPA-600/7-80-135) Avail: NTIS HC A04/MF A01 CSCL 13B

This report contains a summary of emission factors for the combustion of refuse for the purpose of providing energy recovery or volume reduction. This study was conducted to provide an up to date compliance of these factors for use in planning and assessing the benefits and risks from this industry. GRA

N81-14522# Environmental Protection Agency, Ann Arbor, Mich. Test and Evaluation Branch.
NOx NATIONAL EMISSION INVENTORY ESTIMATES
Mark Wolcott Aug. 1980 32 p refs
(PB80-224058; EPA-AA-TEB-80-19) Avail: NTIS HC A03/MF A01 CSCL 13F

Current and projected estimates of the national emissions inventory for oxides of nitrogen are presented. A description of the methodology used to calculate the inventory is provided. The impact of the proposed regulations on rain acidity is assumed to be proportional to total NOx emissions. While the inventories were used to support the draft regulatory analysis, they can also be used independently since an inventory is presented for the currently promulgated regulations as well as for the proposed regulations. GRA

N81-14523# California Univ., Berkeley. Dept. of Soils and Plant Nutrition.
A SURVEY OF ACID PRECIPITATION IN NORTHERN CALIFORNIA Final Report, 1 Jul. 1978 - 30 Jun. 1979
John G. McColl 19 Feb. 1980 97 p refs Sponsored in part by the California Air Resources Board
(ARB-A7-149-30)
(PB80-225311; ARB-R-80/123) Avail: NTIS HC A05/MF A01 CSCL 13B

Concentrations of 13 elements were determined. Acid rain (pH less than 5.6) was common at all sites. Mean pH varied from 4.42 at San Jose to 5.20 at Davis, and the lowest pH of any storm was 3.71 at San Jose. The primary cause of acidity was the air pollutants NO(x), and secondarily SO(x). There were appreciable quantities of dry deposition. Although NO(-)3 concentration and acidity of wet precipitation were greatest in pollution source areas, total deposition of NO(-)3 and H(+) were greatest in the nonurban receptor areas. Thus ecological effects may be expected within the general easterly, 'wash out fan' of wet precipitation, as well as within pollution source areas. GRA

N81-14524# Arkansas Univ., Fayetteville. Water Resources Research Center.
LASER-PHOTOACOUSTIC DETECTION OF WATER POLLUTANTS, PHASE 1 Completion Report, 1 Oct. 1977 - 30 Mar. 1980
Gregory J. Salamo, Ben Chuang, and Jen-Hsiung Tung Mar. 1980 24 p refs
(Contract DI-14-34-0001-8062)
(PB80-222250; W80-06508; OWRT-B-056-ARK(1)) Avail: NTIS HC A02/MF A01 CSCL 13B

The laser photoacoustic method utilizes a resonant modulated laser beam directed into the sample in its normal environment which produces heat, which then generates pressures fluctuations. These pressure fluctations or sound waves are then detected by a sensitive hydrophone and the sensitivity is about one part in 10 to the 11th power for an organic dye pollutant. Since water itself absorbs energy in the ultraviolet and infrared regions, this technique is limited to pollutants which absorb in the visible part of the spectrum. This problem can be overcome by the use of a pulsed laser which is modulated in frequency. GRA

N81-14525# National Technical Information Service, Springfield, Va.
MANEUVERING AIRCRAFT: NOISE POLLUTION AND CONTROL CITATIONS FROM THE NTIS DATA BASE Progress Report, 1976 - Aug. 1980
Guy E. Habercom, Jr. Sep. 1980 189 p Supersedes NTIS/PS-79/0973 and NTIS/PS-78/0930
(PB80-815566; NTIS/PS-79/0973; NTIS/PS-78/0930) Avail: NTIS HC $30.00/MF $30.00 CSCL 13B

Methods for alleviating noise created by maneuvering aircraft are cited. Flyby, turning flight, takeoffs, and landings are the maneuvers investigated. This updated bibliography contains

184 citations, 25 of which are new entries to the previous edition. GRA

N81-14526# National Technical Information Service, Springfield, Va.
URBAN AIR POLLUTION. CITATIONS FROM THE NTIS DATA BASE Progress Report, 1978 - Jul. 1979
Diane M. Cavagnaro Sep. 1980 227 p
(PB80-814411) Avail: NTIS HC $30.00/MF $30.00 CSCL 13B

This bibliography discusses urban air pollution and its abatement. These citations were selected because of their general interest to urban planners which will enable them to become aware of new abatement strategies and techniques. The majority of the studies cover various aspects of transportation emissions. Other topics include health standards, atmospheric models to aid in planning, law enforcement, abatement policies, and the effects, of new modes of transportation. This updated bibliography contains 221 citations, none of which are new entries to the previous edition. GRA

46 GEOPHYSICS

Includes aeronomy; upper and lower atmosphere studies; ionospheric and magnetospheric physics; and geomagnetism.

For space radiation see *93 Space Radiation.*

N81-14527 Institut d'Aeronomie Spatiale de Belgique, Brussels.
ION-EXOSPHERE WITH ANISOTROPIC VELOCITY DISTRIBUTION
M. Scherer 1980 44 p refs Submitted for publication
(Aeronomica-Acta-A-215-1980) Avail: Issuing Activity

The influence of an anisotropy in the velocity distribution at the exobase on the state variables in an open exosphere is studied for three different models corresponding respectively to an anisotropy in the velocity distribution of each species. Numerical calculations show that the effect of an anisotropy in the velocity distribution is more important for the electrons than for hydrogen ions or oxygen ions. For reasonable values of the parameter characterizing the anisotropy, the results do no differ qualitatively from those obtained in earlier kinetic polar wind models, i.e., the protons are accelerated outwards by a small charge separation electric field and the proton flow speed rapidly becomes supersonic. Author

N81-14528 Institut d'Aeronomie Spatiale de Belgique, Brussels.
NEGATIVE ION CHEMISTRY IN THE TERRESTRIAL D-REGION AND SIGNAL FLOW GRAPH THEORY
J. Wisemberg and G. Kockarts 1980 54 p refs Submitted for publication
(Aeronomica-Acta-A-217-1980) Avail: Issuing Activity

A negative ion model was obtained for daytime conditions by using the signal flow graph technique which is briefly described. This reference model was analyzed in terms of transmittances, path gains and loop gains. An arbitrary variation of atomic oxygen and nitric oxide was introduced at a height of 65 km in order to show the induced effects on the negative ions and, on the electron concentrations. Variations of the ratio lambda between negative ions and electrons are also presented. Author

N81-14529 Institut d'Aeronomie Spatiale de Belgique, Brussels.
UPPER ATMOSPHERIC WINDS [LES VENTS DANS LA HAUTE ATMOSPHERE]
E. vanHemelrijck 1980 30 p refs In FRENCH; ENGLISH summary Submitted for publication
(Aeronomica-Acta-A-219-1980) Avail: Issuing Activity

A brief description of the principal wind determination methods in the upper atmosphere is given. Then, the creation of artificial clouds in the thermosphere is discussed in more detail. An analysis of the obtained results reveals that the dynamical behaviour of the lower thermosphere is quite different from that of the region above an altitude of approximatively 150 km. In the lower thermosphere the winds are highly variable and, in general, smaller than those in the upper atmosphere. The spiral structure, high shear and the stratification phenomenon, characteristic features below an altitude of about 150 km, are not present in the upper thermosphere. Vertical winds in the whole thermosphere are usually found to be small compared to the horizontal component and are difficult to measure. Precise height resolution of about 100 m up to 150 km and 1 km in the upper thermosphere are reported. The accuracy of wind speed determination is on the order of 1 to 5 meters per sec. Author

N81-14530*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
THE SWEPT ANGLE RETARDING MASS SPECTROMETER: INITIAL RESULTS FROM THE MICHIGAN AURORAL PROBE SOUNDING ROCKET
D. L. Reasoner, C. R. Chappell, N. H. Stone, W. E. Sharp (Michigan Univ., Ann Arbor), and J. H. Hoffman (Texas Univ. at Dallas) Dec. 1980 21 p refs
(NASA-TM-78317) Avail: NTIS HC A02/MF A01 CSCL 04A

Data from a sounding rocket flight of the swept angle retarding ion mass spectrometer (SARIMS) are presented to demonstrate the capability of the instrument to make measurements of thermal ions which are differential in angle, energy, and mass. The SARIMS was flown on the Michigan auroral probe over regions characterized first by discrete auroral arcs and later by diffuse precipitation. The instrument measured the temperature, densities, and flow velocities of the ions NO(+) and O(+). Measured NO(+) densities ranged from 10 to the 5th power up to 3 x 10 to the 5th power ions/cu cm, while the measured O(+) densities were a factor of 5-10 less. Ion temperatures ranged from 0.15 up to 0.33 eV. Eastward ion flows approximately 0.5 km/sec were measured near the arcs, and the observed flow magnitude decreased markedly inside the arcs. Author

N81-14531*# San Jose State Univ., Calif.
ONE-DIMENSIONAL SIMULATION OF TEMPERATURE AND MOISTURE IN ATMOSPHERIC AND SOIL BOUNDARY LAYERS Final Report
Robert D. Bornstein and Krishnamurthy Santhanam (Informatics, Inc., Palo Alto, Calif.) Jan. 1981 6 p refs
(Grant NsG-2184)
(NASA-CR-163841) Avail: NTIS HC A02/MF A01 CSCL 04A

Meteorologists are interested in modeling the vertical flow of heat and moisture through the soil in order to better simulate the vertical and temporal variations of the atmospheric boundary layer. The one dimensional planetary boundary layer model of is modified by the addition of transport equations to be solved by a finite difference technique to predict soil moisture. Author

N81-14532*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
COORDINATED IONOSPHERIC AND MAGNETOSPHERIC OBSERVATIONS FROM THE ISIS 2 SATELLITE BY THE ISIS 2 EXPERIMENTERS. VOLUME 3: HIGH-LATITUDE CHARGED PARTICLE, MAGNETIC FIELD, AND IONOSPHERIC PLASMA OBSERVATIONS DURING NORTHERN SUMMER
Nov. 1980 259 p refs
(NASA-TM-82223: NSSDC-80-05) Avail: NTIS HC A12/MF A01 CSCL 04A

Typical values and range of ionospheric and magnetospheric characteristics, as viewed from 1400 km with the ISIS 2 instruments are presented. Preceding the data set is a description of the organizational parameters and a review of the objectives and general characteristics of the data set. The data are shown as a selection from 12 different data formats. Each data set has a different selection of formats, but uniformity of a given format selection is preserved throughout each data set. A description of how to interpret each format is given. Author

N81-14533# Stockholm Univ. (Sweden). Dept. of Meteorology.
AIR CHEMISTRY MEASUREMENTS IN THE LOWER ATMOSPHERE OVER SWEDEN: DATA EVALUATION
Cloes Traegaardh Mar. 1980 47 p refs Prepared jointly with Intern. Meteorol. Inst.
(Grants SWED-EPB-7-120/74; SWED-EPB-7-151/75; SWED-EPB-7-151/76; SWED-EPB-7-151/77)

(AC-45; Rept-1980-03-11) Avail: NTIS HC A03/MF A01

Sulfur dioxide, sulfate in aerosols, and the light scattering coefficient were measured up to three kilometers over Sweden with a small aircraft. Data show that the transformation rate for SO2 yields SO4(2-) may be higher at higher altitudes. The transformation rate estimated from observed data is 0.014 h/1 (1.4% h/1) in summer and 0.008 h/1 (0.8% h/1) in winter. The scale height is 1150 m for SO2-S and 1350 m for SO4(2-)-S. The sulfate/light scattering ratio is near 0.1 mg/2 i.e., about half of the optical effect is due to sulfate in aerosols. A.R.H.

N81-14534# Prakla-Seismos G.m.b.H., Hannover (West Germany).

DIRECT DETECTION OF HYDROCARBONS USING SEISMIC PROCEDURES Final Report

Karl-Otto Millahn, Horst Koitka, Dieter Jurczyk, and Werner S. Jankowsky (Deminex, Deut. Erdoelversorgungsges mbH) Bonn Bundesministerium fuer Forschung und Technologie Oct. 1979 161 p refs In GERMAN; ENGLISH summary Sponsored for Bundesministerium fuer Forschung und Technology

(BMFT-FB-T-79-31; ISSN-0340-7608) Avail: NTIS HC A08/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 33,40

Methods for determination of amplitudes and spectra of seismic signals were combined to form a reliable and versatile interpretational system which allows an economical, semiautomatic extraction and a spatial presentation of various seismic parameters for lithological studies. An application of the system to an offshore survey area showed clear correlation between high amplitude anomalies and gas zones. Other indicators of hydrocarbons did not show much significant anomalies. Any quantitative interpretation of the results was impeded by complex layering of sandbeds which could not be resolved by seismic techniques. A method was developed which allows a reliable determination of frequency dependent attenuation if clear signals, undistorted by interference, are available and if comparatively high minimal attenuation is present. Author

N81-14535# Research Inst. of National Defence, Stockholm (Sweden).

INTERNAL SEISMOLOGICAL STATIONS FOR MONITORING A COMPREHENSIVE TEST BAN THEORY

Ola Dahlman and Hans Israelson Jun. 1980 49 p refs

(FOA-C-20358-T1) Avail: NTIS HC A03/MF A01

Verification of the compliance with a Comprehensive Test Ban on nuclear explosions is expected to be carried out by a seismological verification system of some fifty globally distributed teleseismic stations designed to monitor underground explosions at large distances (beyond 2000 km). It is attempted to assess various technical purposes that such internal stations might serve in relation to a global network of seismological stations. The assessment is based on estimates of the detection capabilities of hypothetical networks of internal stations. Estimates partaining to currently used detection techniques (P waves) indicate that a limited number (less than 30) of such stations would not improve significantly upon the detection capability that a global network of stations would have throughout the territories of the US and the USSR. Recently available and not yet fully analyzed data indicate however that very high detection capabilities might be obtained in certain regions. Author

N81-14536# Danish Meteorological Inst., Copenhagen. Dept. of Geophysics.

THE QUIET-TIME PATTERN OF AURORAL ARCS AS A CONSEQUENCE OF MAGNETOSPHERIC CONVECTION

K. Lassen Aug. 1979 10 p refs Submitted for publication

(DMI-Geophys-Papers-R-56; ISBN-87-7478-167-7) Avail: NTIS HC A02/MF A01

Quiet time patterns of discrete auroral arcs are compared with magnetospheric convection patterns for corresponding orientations of the interplanetary magnetic field. The position and orientation of upward field aligned currents predicted from the presence of shears and flow irregularities in the convection are shown to be similar to those of the auroral arcs. It is concluded that the quiet time patterns are optical signatures of shears and flow irregularities in the magnetospheric convection. The quiet time Sun aligned polar cap arcs may be regarded as optical signatures of sunward convection across the polar cap. ESA

N81-14537# Danish Meteorological Inst., Copenhagen.

OCCURRENCES OF THE POLAR SLANT E CONDITION (SEC) AT MARSSARSSUAQ, GODHAVN, THULE, 1978

I. S. Primdahl 1979 46 p refs

(ISBN-87-7478-165-0) Avail: NTIS HC A03/MF A01

Tables of Slant E condition (SEC) occurrences scaled from the ionograms of Thule, Godhave, and Narssarssuaq for 1978 are given. References demonstrating the use of the SEC phenomenon in the polar cap are also presented. L.F.M.

N81-14538# Royal Netherlands Meteorological Inst., De Bilt.

SEISMOLOGICAL BULLETIN OF THE SEISMOGRAPH STATIONS IN THE NETHERLANDS, VOLUME 63, 1975

1980 138 p

(KNMI-108-63) Avail: NTIS HC A07/MF A01

Geodetic coordinates of the stations are presented. Calibrations for each of the seismographs are given. Tables of seismic activity are included. T.M.

N81-14539# Mission Research Corp., Santa Barbara, Calif.

ISIS TOPSIDE SOUNDER DATA GATHERED ON KWAJALEIN ATOLL DURING THE SUMMERS OF 1977 AND 1978 Final Report, 10 Jan. 1977 - 31 Oct. 1980

Gordon J. Fulks 31 Oct. 1980 286 p refs

(Contract DNA001-77-C-0096)

(AD-A091845; MRC-R-548; DNA-5339F) Avail: NTIS HC A13/MF A01 CSCL 04/1

In conjunction with the DNA Wideband Equatorial program, ISIS topside sounder data was gathered during the summers of 1977 and 1978 on Kwajalein Atoll, Marshall Islands. In addition, signal scintillation information using the VHF satellite telemetry signal was obtained in 1978. This report provides a summary of all the data including a description of each of the 252 satellite passes recorded. Preliminary data analysis shows that the active ionospheric region producing both severe signal scintillations and severe spread-F is coincident with the equatorial anomaly region. As this region rises in the post-sunset period and then rapidly descends, 'exploded traces' appear on many equatorial ionograms. These field-aligned structures which are identified as plumes and may be related to equatorial bubbles, extend along the magnetic field from one conjugate region to the other and prefer the magnetic field line from 15 N to 15 S magnetic latitude. They have a limited east-west extent. Sometimes several can be seen to the east or west of the satellite separated by a smooth temperature. Magnetic field-aligned ducts of depleted ionization are also an irregularity feature seen on low latitude ionograms in the evening. Those occurring within the anomaly region are potentially remnants of bubbles which have risen high on the topside and broken up. Those outside the anomaly region appear before the anomaly region breakup and are thus not directly related to bubbles. However, the mechanism producing them may also play a part in the formation of bubbles. GRA

N81-14540# Massachusetts Univ., Amherst. Astronomy Research Facility.

INFRARED EMISSION SPECTROSCOPY OF LOW PRESSURE GASEOUS DISCHARGES, 3 Interim Report

Hajime Sakai Hanscom AFB, Mass. AFGL May 1980 34 p refs

(Contract F19628-76-C-0087; AF Proj. 2310)

(AD-A091744; UMASS-ARF-80-309; AFGL-TR-80-0157; SR-3) Avail: NTIS HC A03/MF A01 CSCL 04/1

Our study conducted on the infrared NH band is described in this report. The emission was observed both in decomposition and in recombination processes. GRA

N81-14541*# National Bureau of Standards, Washington, D.C. Chemical Kinetics Div.

CHEMICAL KINETIC AND PHOTOCHEMICAL DATA SHEETS FOR ATMOSPHERIC REACTIONS

R. F. Hampson Apr. 1980 489 p Sponsored in part by NASA

(Contract DOT-FA79WAI-005)

(AD-A091631; FAA-EE-80-17) Avail: NTIS HC A21/MF A01 CSCL 04/1

A set of individual data sheets for gas phase chemical reactions and photochemistry of neutral species is presented. These data sheets give preferred values for reaction rate constants,

photoabsorption cross sections and quantum yields with a brief statement discussing the basis for the preferred value. Recent experimental results are also given. The coverage of this initial set of data sheets issued in February 1980 corresponds to the approximately 400 reactions listed in NBS Special Publication 513, R. F. Hampson and D. Garvin, May 1978. For approximately one quarter of these reactions the data entry has been updated to include the 1979 recommendations of the NASA Panel for Data Evaluation and the CODATA Task Group on Chemical Kinetics. They are intended to provide the basic physical chemical data needed as input data for calculations modeling atmospheric chemistry. Revisions and additions for specific reactions will be published as new information becomes available. GRA

N81-14542# TRW Defense and Space Systems Group, Redondo Beach, Calif.

MONTE CARLO SIMULATION OF NEGATIVE ION COLLECTION BY A ROCKET BORNE MASS SPECTROMETER Final Report, Jan. 1977 - Dec. 1979

Takashi Sugimura and R. D. McGregor Jun. 1980 57 p refs
(Contract F19628-77-C-0020; AF Proj. 2310)
(AD-A091721; AFGL-TR-80-0206) Avail: NTIS HC A04/MF A01 CSCL 07/4

The direct simulation Monte Carlo method developed for the prediction of positive ion collection by a rocket-borne probe has to be extended to simulate negative ion collection. It is found that realistic probe potentials can produce a high stagnation-point flux of negative ions while completely rejecting positive ions. However, this flux of negative ions is strongly attenuated by collisions at finite Knudsen numbers. Additionally, the necessary theory has been developed so that direct simulation of nonequilibrium chemistry in the ionosphere can be performed. GRA

N81-14543# Control Data Corp., Minneapolis, Minn. Research Div.

A NEW TROPOPAUSE DEFINITION FROM SIMULTANEOUS OZONE TEMPERATURE PROFILES Interim Technical Report, 1 Jul. 1979 - 1 Jul. 1980

Jon M. Roe and W. H. Jasperson Aug. 1980 16 p
(Contract F19628-79-C-0098; AF Proj. 6687)
(AD-A091718; AFGL-TR-80-0289; ITR-1) Avail: NTIS HC A02/MF A01 CSCL 04/1

Historically, the tropopause has been defined arbitrarily in terms of particular features present in a temperature profile. This study suggests a modified definition which is consistent with the assumption that the tropopause is a boundary between the ozone rich air of the stratosphere and the ozone poor air of the troposphere. Several hundred simultaneous temperature and ozone profiles from the middle 1960s and the latter 1970s were examined in order to arrive at a tropopause definition based on temperature and yet consistent with the ozone evidence. These data span a wide range of latitudes and seasons. Agreement between the conventional World Meteorological Organization (WMO) defined tropopause based on temperature lapse rate, and a tropopause defined subjectively on the basis of ozone gradients was found to be only 68%. However, a modification of the WMO tropopause definition, which relaxed the thickness criterion and considered the relative change in lapse rate from troposphere to stratosphere, produced a 95% agreement with the subjective tropopause based on ozone. GRA

N81-14544# Los Alamos Scientific Lab., N. Mex.

IONOSPHERIC EFFECTS OF ROCKET EXHAUST PRODUCTS (HEAO-C, SKYLAB AND SPS-HLLV)

John Zinn, C. Dexter Sutherland, Sidney N. Stone, Lewis M. Duncan, and Richard Behnke (Arecibo Observatory, Puerto Rico) Oct. 1980 35 p refs
(Contract W-7405-eng-36)
(DOE/ER-0082) Avail: NTIS HC A03/MF A01

The problem of ionospheric F layer depletions produced by chemical effects of the exhaust gases from large rockets is discussed. Experimental airglow and incoherent scatter radar measurements performed in conjunction with the 1979 launch of satellite HEAO-C, together with prelaunch and post launch computations of the ionospheric effects are described. Several improvements in the model were driven by the experimental observations. The computer model is described in some detail. Author

N81-14545# Oak Ridge National Lab., Tenn. Chemistry Div.

SYSTEMATIC STUDY OF METAL ION SORPTION ON SELECTED GEOLOGIC MEDIA Annual Report, Oct. 1978 - Dec. 1979

R. E. Meyer, comp. Jun. 1980 85 p refs
(Contract W-7405-eng-26)
(DOE/BETC/OR-14) Avail: NTIS HC A05/MF A01

The distribution of No(1) and Ca(II) ions between a common clay, montmorillonite, as well as several other clays and a series of solutions of constant total ionic strength with varying ionic strength fraction of sodium was investigated and distribution coefficients for Sr(II) were determined for a variety of conditions on various clay minerals and oxides. In general for clay minerals, the values of DSr decrease sharply with salinity and except for kaolinite are fairly independent of pH. For adsorption of Sr(II) on oxides, values of D tend to depend only slightly on salinity but increase sharply with pH. For adsorption of Ni(II), Zn(II), Co(II), and Ca(II) ions on montmorillonite, it was found that distribution coefficients were highly dependent on both pH and loading. At low loadings, up to about 0.1 to 1% of the capacity, distribution coefficients were found to be much higher than they are at higher loadings. For Cd(II) in solutions of high chloride concentration where Cd(II) forms chloride complexes, the values of D are lower than in noncomplexing media. DOE

N81-14546# Northrop Services, Inc., Huntsville, Ala.

SITE INSOLATION AND WIND POWER CHARACTERISTICS Summary Report

Roger E. Bray Aug. 1980 155 p refs 6 Vol.
(Contracts DE-AC01-77ET-20160; EG-77-C-01-4016)
(DOE/CS-20160/01-Vol-1) Avail: NTIS HC A08/MF A01

Historic solar and wind data available at 101 National Weather Service stations were processed statistically. Preliminary planning data are provided for selected daily average solar and wind power conditions occurring and persisting for time periods of interest. Solar data are global radiation incident on a horizontal surface, and wind data represent wind power normal to the air flow. Empirical probabilities were constructed from the historic data to provide a reasonable inference of the chance of similar climatological conditions occurring at any given time in the future. Data used to obtain the daily average solar and wind power probabilities were combined into monthly averages and are presented. Average monthly seasonal and annual solar and wind power trends were prepared to provide an overview for identifying areas for further investigation. Author

N81-14547# Du Pont de Nemours (E. I.) and Co., Aiken, S.C.

CAROLINA GEOLOGICAL SOCIETY FIELD TRIP GUIDEBOOK, 11-12 OCTOBER 1980. GEOLOGICAL INVESTIGATIONS OF PIEDMONT AND TRIASSIC ROCKS, CENTRAL NORTH CAROLINA AND VIRGINIA (WITH A FIELD TRIP GUIDE ON THE BEDROCK GEOLOGY OF SOUTH CENTRAL VIRGINIA)

Van Price, Jr., ed., Paul A. Thayer, ed. (North Carolina Univ. at Wilmington), and W. A. Ranson, ed. (Furman Univ.) Oct. 1980 238 p refs Sponsored by DOE
(DOE/SR-00001/T2) Avail: NTIS HC A11/MF A01

The Sandy Level quadrangle, located in the southwestern Virginia Piedmont was mapped during the interval 1975-1978. The geology of the Sandy Level quadrangle and its relationship to regional geology is described. During geologic mapping a number of formations were mapped. They were the Lynchburg Formation and overlying Candler Formation on the southeast limb of the Blue Ridge anticlinorium, and the Fork Mountain and Bassett formations of the Smith River Allochton. Rocks of the Candler and overlying rocks named Archer Creek and Mt. Athos formations were considered to make up a stratigraphic sequence called the Evington Group. However, the Evington Group is made up of rocks of vastly different ages that were brought into structural contact with each other and are not a stratigraphic sequence as previously proposed. T.M.

N81-14548# La Jolla Inst., Calif.

PROCEEDINGS OF THE WORKSHOP ON MODIFICATION OF THE UPPER ATMOSPHERE BY SATELLITE POWER

SYSTEM (SPS) PROPULSION EFFLUENTS
Ernest Bauer Jun. 1980 136 p refs Workshop held in La Jolla, Calif., 25-27 Jun. 1980
(Contract W-31-109-eng-38)
(CONF-7906180) Avail: NTIS HC A07/MF A01

Problems include: the extent, magnitude, and variability of the predicted depletion in F-region ionization together with descriptions of water and hydrogen injections into atmosphere characteristic of SPS vehicles and flight profiles; the long-term variations in mesospheric humidity and cloudiness with and without SPS operations; and the description of condensation and evaporation processes of water exhausted from high altitude rockets in order to predict mesospheric contrail formation and dissipation. Furthermore, in considering argon ion rocket transport to geosynchronous orbit, the stopping and lifetime of the argon ion beams and consequent changes in the radiation belts, especially as they affect spacecraft was also discussed. DOE

N81-14549# Fermi National Accelerator Lab., Batavia, Ill.
PROSPECTS FOR SUPERGRAVITY
B. Zumino Aug. 1980 6 p refs Presented at 20th Intern. Conf. on High Energy Phys., Madison, Wis., 17 Jun. 1980
(Contract DE-AC02-76CH-03000)
(FERMILAB-CONF-80/74-THY) Avail: NTIS HC A02/MF A01

Present particle phenomenology appears to be successfully described by a renormalizable gauge theory based on the low-energy group SU(3)/sub color/ x SU(2)/sub left/ x U(1). The three effective coupling constants of this theory vary with energy according to the renormalization group equations and become approximately equal at an energy of about 10 to the 14th power - 10 to the 15th power GeV, where one can attempt a grand unified theory based on a gauge group with only one coupling constant and containing the low-energy group. A natural way to unify gravity with lower-spin fields is provided by supergravity, the supersymmetric extension of Einstein's gravity. The largest supergravity theory (largest theory with a supermultiplet with maximum spin not exceeding two) is the N = 8 theory (N is the number of supersymmetries), which has an SO(8) internal symmetry. DOE

N81-14550# Los Alamos Scientific Lab., N. Mex.
STATISTICAL RELATIONSHIP BETWEEN MEDIAN VISIBILITY AND CONDITIONS OF WORSTCASE MANMADE IMPACT ON VISIBILITY
John D. Gins (Technology Service Corp., Santa Monica, Calif.), David Nochumson, and John Trijonis (Santa Fe Research Corp., N. Mex.) 1980 16 p refs Presented at the Symp. on Plumes and Visibility, Grand Canyon, Ariz., 10-14 Nov. 1980
(Contract W-7405-eng-36)
(LA-UR-80-2485; CONF-801114-1) Avail: NTIS HC A02/MF A01

The data base for the study consisted of midday visibility recordings for the years 1974 to 1976 at 28 suburban/nonurban airports throughout the United States. The visibility recordings were converted to estimates of extinction coefficients with the use of the Koschmeider formula. The data were sorted according to meteorology in order to eliminate days that were obviously dominated by natural causes of poor visibility. Three approaches were used for relating worst-case extinction to median extinction. The first approach was based upon frequency distribution functions. The second used observed ratios of upper percentile to median extinction. The third employed regression techniques. All ot the relationships were formulated and evaluated with the 1974 to 1976 data on a national/annual basis as well as regional/quarterly basis. Performance tests were run against 1954 to 1956 data at 11 of the 28 sites. Simple ratio relationships are recommended for use in translating median visibility impacts into worst-case impacts. The errors associated with these ratio models are approximately 30%. DOE

N81-14551# Woods Hole Oceanographic Institution, Mass.
APPLICATIONS OF TIME SERIES ANALYSIS TO GEOPHYSICAL DATA Ph.D. Thesis
Alan Chave Aug. 1980 186 p refs
(Grants NSF OCE-77-82255; NSF OCE-79-19258; NSF OCE-77-8633)
(PB80-213978; WHOI-80-35) Avail: NTIS HC A09/MF A01 CSCL 08G

Surface wave dispersion along the Walvis Ridge, south Atlantic Ocean, is obtained by bandpass filtering the recorded seismogram in the frequency domain. The group velocity is anomalously low in the period range of 15-50 s, and formal inversion of the data indicates both crustal thickening to 12.5 km and low shear velocity (4.25-4.35 km/s) to depths of 40-50 km. The electromagnetic induction fields at a deep ocean site northeast of Hawaii were used to determine the electrical conductivity of the Earth to 400 km depth. A set of piston cores from the northeast Atlantic Ocean are used to construct paleomagnetic time series covering the interval 25-127 kybp. Stratigraphic control is provided by counts of planktonic foraminifera, and empirical orthogonal function analysis shows a significant decrease in sedimentation rate at the interglacial/glacial transition. GRA

N81-14366*# California Inst. of Tech., Pasadena. Seismological Lab.
CONVECTION, COMPOSITION AND THE THERMAL STATE OF THE LOWER MANTLE Final Technical Report
Raymond Jeanloz and Frank M. Richter *In* Its Theoret. Invest. of Lunar and Planetary Interiors 30 Jun. 1980 31 p refs (For primary document see N81-14365 05-42)
(Grant NGL 05-002-069)
Avail: NTIS HC A03/MF A01 CSCL 08G

N81-14368*# California Inst. of Tech., Pasadena. Seismological Lab.
HOTSPOTS, BASALTS AND THE EVOLUTION OF THE MANTLE Final Technical Report
Don L. Anderson *In its* Theoret. Invest. of Lunar and Planetary Interiors 30 Jun. 1980 33 p refs (For primary document see N81-14365 05-42)
(Grant NGL-05-002-069)
Avail: NTIS HC A03/MF A01 CSCL 08G

N81-14369*# California Inst. of Tech., Pasadena. Seismological Lab.
BASALTIC VOLCANISM CONTRIBUTION Final Technical Report
Don L. Anderson *In* Its Theoret. Invest. of Lunar and Planetary Interiors 30 Jun. 1980 12 p refs (For primary document see N81-14365 05-42)
(Grant NGL-05-002-069)
Avail: NTIS HC A02/MF A01 CSCL 08K

N81-14945*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
SPACELAB EXPERIMENT: ALAE, ATMOSPHERIC LYMAN-ALPHA EMISSIONS
In its Space Plasma Phys. Active Expt. Oct. 1980 p 1-8 refs (For primary document see N81-14944 05-99)
Avail: NTIS HC A11/MF A01 CSCL 04A

N81-14946*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
ATMOSPHERIC EMISSION PHOTOMETRIC IMAGING ON SPACELAB (AEPI)
S. B. Mende (Lockheed Palo Alto Research Lab., Calif.), W. G. Sandie (Lockheed Palo Alto Research Lab., Calif.), R. H. Eather (Boston College, Mass.), G. R. Swenson, K. S. Clifton, and P. M. Banks (Utah State Univ., Logan) *In its* Space Plasma Phys. Active Expt. Oct. 1980 p 9-26 refs (For primary document see N81-14944 05-99)
Avail: NTIS HC A11/MF A01 CSCL 04A

N81-14947*# Utah State Univ., Logan. Center for Atmospheric and Space Sciences.
TRACE CONSTITUENTS IN THE MIDDLE ATMOSPHERE BY HIGH RESOLUTION UV SPECTROSCOPY
Douglas G. Torr, M. R. Torr, T. M. Donahue (Michigan Univ.), G. R. Carignan (Michigan Univ.), A. F. Nagy (Michigan Univ.), P. B. Hays (Michigan Univ.), E. R. Young (Michigan Univ.), S. K. Atreya (Michigan Univ.), J. P. Noxon (NOAA), and J. C. G. Walker (Arecibo Observatory, Puerto Rico) *In* NASA. Marshall Space Flight Center Space Plasma Phys. Active Expt. Oct. 1980 p 26-56 refs (For primary document see N81-14944 05-99)
HC A11/MF A01 CSCL 04A

N81-14948*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
MEASUREMENT OF VISIBLE AND UV EMISSION FROM ENERGETIC NEUTRAL ATOM PRECIPITATION (ENAP), ON SPACELAB
Brian A. Tinsley *In its* Space Plasma Phys. Active Expt. Oct. 1980 p 57-74 refs (For primary document see N81-14944 05-99)
HC A11/MF A01 CSCL 04A

47 METEOROLOGY AND CLIMATOLOGY

Includes weather forecasting and modification.

N81-14552*# *National Aeronautics and Space Administration.* Marshall Space Flight Center, Huntsville, Ala.
A PRELIMINARY LOOK AT AVE-SESAME 4 CONDUCTED *ON 9-10 MAY 1979*
Michael J. July (Texas A and M Univ.) and Robert E. Turner Nov. 1980 59 p refs
(NASA-TM-78314) Avail: NTIS HC A04/MF A01 CSCL 04B

This report contains information on data collected, symptotic conditions, and severe and unusual weather reported during the Atmospheric Variability Experiment Severe Environmental Storms *and Mesoscale Experiment (AVE-SESAME) 4 period. The* information provides researchers a look at conditions during the period. Author

N81-14553*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala. Space Sciences Lab.
AVE-SESAME IV: 25 MB SOUNDING DATA
Meta E. Sienkiewicz (Texas A and M Univ., College Station), Luke P. Gilchrist (GLG Co., Inc., Lacay's Springs, Ala.), and Robert E. Turner Nov. 1980 389 p refs
(NASA-TM-78315) Avail: NTIS HC A17/MF A01 CSCL 04B

The rawinsonde sounding program for the AVE-SESAME 4 experiment is described and tabulated data at 25 mb for the 23 National Weather Service and 20 special stations participating in the experiment are presented. Soundings were taken at 3 hr intervals beginning at 1200 GMT on May 9, 1979, and ending at 1200 GMT on May 10, 1979 (nine sounding times). The method of processing is discussed, estimates of the rms errors in the data are presented, and an example of contact data is given. Reasons are given for the termination of soundings below 100 mb, and soundings are listed which exhibit abnormal characteristics. Author

N81-14554*# *Computer Sciences Corp., Silver Spring, Md.*
EVALUATION OF ATMOSPHERIC DENSITY MODELS AND PRELIMINARY FUNCTIONAL SPECIFICATIONS FOR THE *LANGLEY ATMOSPHERIC INFORMATION RETRIEVAL* SYSTEM (LAIRS)
T. Lee and D. F. Boland, Jr. Sep. 1980 118 p refs
(Contract NAS1-15663)
(NASA-CR-159374; CSC/TM-80/6240) Avail: NTIS HC A06/MF A01 CSCL 04B

This document presents the results of an extensive survey and comparative evaluation of current atmosphere and wind models for inclusion in the Langley Atmospheric Information *Retrieval System (LAIRS). It includes recommended models for* use in LAIRS, estimated accuracies for the recommended models, and functional specifications for the development of LAIRS. Author

N81-14555*# National Aeronautics and Space Administration. *Marshall Space Flight Center, Huntsville, Ala.*
PROCEEDINGS: FOURTH ANNUAL WORKSHOP ON METEOROLOGICAL AND ENVIRONMENTAL INPUTS TO *AVIATION SYSTEMS*
Walter Frost, ed. and Dennis W. Camp, ed. Mar. 1980 287 p refs Workshop held in Tullahoma, Tenn., 25-27 Mar. 1980; sponsored in part by FAA and NOAA *Prepared in cooperation* with Tennessee Univ. Space Inst.
(Contract NAS8-32692)
(NASA-CP-2139; FAA-RD-80-67) Avail: NTIS HC A13/MF A01 CSCL 04B

Various aspects of the interaction of the atmosphere with aviation systems are discussed. The topics for discussion addressed the following: winds and wind shear; turbulence; icing and frost; fog, visibility, and ceiling; and atmospheric electricity and lightning. For individual titles, see N81-14556 through N81-14574.

N81-14556*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
SURVEY OF WORKSHOPS ON METEOROLOGICAL AND ENVIRONMENTAL INPUTS TO AVIATION SYSTEMS
Walter Frost (Tennessee Univ. Space Inst.) and Dennis W. Camp *In its Proc: Fourth Ann. Workshop on Meteorol. and Environ.* Inputs to Aviation Systems Mar. 1980 p 23-39 (For primary document see N81-14555 05-47)
Avail: NTIS HC A13/MF A01 CSCL 04B

Various aspects of aviation meteorology are discussed with respect to their relative effects on aircraft terminal operations. Existing data on turbulence and wind shear from aircraft and towers are summarized. The significance of obtaining more real *time wind and temperature information is emphasized. The* application and testing of various radiometer devices are also described. Airborne methods to indicate wind differences at flight altitude and at touchdown are reported. R.C.T.

N81-14557*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
AVIATION METEOROLOGY RESEARCH AND DEVELOP*MENT: A STATUS REPORT*
John Enders *In its* Proc: Fourth Ann. Workshop on Meteorol. and Environ. Inputs to Aviation Systems Mar. 1980 p 40-44 (For primary document see N81-14555 05-47)
Avail: NTIS HC A13/MF A01 CSCL 04B

The dynamic and rapid growth of technology in the area of aviation meteorology research and development are described with emphasis on the measurement of hazardous weather *phenomena. Aspects of both onboard instrumentation and* ground based facilities are evaluated in terms of their effectiveness of in avoiding hazards due to atmospheric electricity and lightning. *Methods of alleviating terminal are hazards such as fog, low* visibility and ceilings are also described. R.C.T.

N81-14558*# *National Aeronautics and Space Administration.* Marshall Space Flight Center, Huntsville, Ala.
FEDERAL AVIATION ADMINISTRATION AND NATIONAL WEATHER SERVICE AVIATION RESEARCH AND DEVELOPMENT
John W. Connolly *In its* Proc: Fourth Ann. Workshop on Meteorol. and Environ. Inputs to Aviation Systems Mar. 1980 p 45-48 (For primary document see N81-14555 05-47)
Avail: NTIS HC A13/MF A01 CSCL 04B

An overview is given of the developmental status of aviation weather services. Particular attention is given to justifying the need for better, more reliable service. The accomplishments of several automatic weather stations are discussed. R.C.T.

N81-14559*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
ICING INSTRUMENTATION
William Olsen *In* NASA. Marshall Space Flight Center *Proc: Fourth Ann. Workshop on Meteorol. and Environ. Inputs to Aviation* Systems Mar. 1980 p 49-60 refs (For primary document see N81-14555 05-47)
Avail: NTIS HC A13/MF A01 CSCL 04B

The types and usage categories of icing instrumentation are discussed. The state-of-the-art for the technology governing the use of icing instrumentation is reported with particular emphasis on ground based facilities for icing tests. R.C.T.

N81-14560*# Army Test and Evaluation Command, Aberdeen Proving Ground, Md.
AIRCRAFT ICING INSTRUMENTATION: UNFILLED NEEDS
Phyllis F. Kitchens *In* NASA. Marshall Space Flight Center

Proc: Fourth Ann. Workshop on Meteorol. and Environ. Inputs to Aviation Systems Mar. 1980 p 61-65 (For primary document see N81-14555 05-47)
Avail: NTIS HC A13/MF A01 CSCL 04B

A list of icing instrumentation requirements are presented. Because of the Army's helicopter orientation, many of the suggestions are specific to rotary wing aircraft; however, some of the instrumentation are also suitable for general aviation aircraft. R.C.T.

N81-14561*# Lockheed Aircraft Service Co., Pasadena, Calif.
TURBULENCE: FROM A PILOT'S VIEWPOINT
Charles L. Pocock *In* NASA. Marshall Space Flight Center Proc: Fourth Ann. Workshop on Meteorol. and Environ. Inputs to Aviation Systems Mar. 1980 p 66-70 (For primary document see N81-14555 05-47)
Avail: NTIS HC A13/MF A01 CSCL 04B

The measurement of atmospheric turbulence is discussed in terms of a pilots viewpoint. Two areas of measurement are considered: frequency and severity of turbulence. Suggestions are given for helping the pilot solve the turbulence problem. R.C.T.

N81-14562*# National Aeronautics and Space Administration. Hugh L. Dryden Flight Research Center, Edwards, Calif.
CLEAR AIR TURBULENCE: HISTORICAL COMMENTS
L. J. Ehernberger *In* NASA. Marshall Space Flight Center Proc: Fourth Ann. Workshop on Meterol. and Environ. Inputs to Aviation Systems Mar. 1980 p 71-81 refs (For primary document see N81-14555 05-47)
Avail: NTIS HC A13/MF A01 CSCL 04B

The basic reference material for gust design criteria are cited. The status of clear air turbulence meteorology (forecasting and detection) is discussed. The directions of further research technology is indicated. R.C.T.

N81-14563*# Federal Aviation Administration, Atlantic City, N.J.
WINDS AND WIND SHEAR IN-SITU SENSORS
R. Craig Goff *In* NASA. Marshall Space Flight Center Proc: Fourth Ann. Workshop on Meteorol. and Environ. Inputs to Aviation Systems Mar. 1980 p 82-108 (For primary document see N81-14555 05-47)
Avail: NTIS HC A13/MF A01 CSCL 04B

The problem of development of instrumentation for providing wind speed and direction information directly or indirectly to a pilot in the cockpit is considered. The pilots need for horizontal wind information at various stages of flight (i.e., at liftoff, in approach and departure corridors, and even in flight outside the terminal area) are emphasized. R.C.T.

N81-14564*# National Severe Storms Lab., Norman, Okla.
REMOTE PROBING OF WIND AND WIND SHEARS
J. T. Lee *In* NASA. Marshall Space Flight Center Proc: Fourth Ann. Workshop on Meteorol. and Environ. Inputs to Aviation Systems Mar. 1980 p 109-124 refs (For primary document see N81-14555 05-47)
Avail: NTIS HC A13/MF A01 CSCL 04B

The ability of various types of remote probes to measure wind is discussed. Two important advantages over in-situ sensors are reported: (1) their ability to measure atmospheric parameters without disturbing the air flow; (2) their ability to scan through large volumes of the atmosphere with relative ease. Direct measurement sensors such as anemometers and wind vanes are categorized into two groups; active and passive. Acoustic radar, microwave radar, and lidar are included in the first group and the latter group is typified by the infrared radiometers. R.C.T.

N81-14565*# Atmospheric Sciences Lab., White Sands Missile Range, N. Mex.
CEILING AND VISIBILITY INSTRUMENTATION WITHIN GOVERNMENT AGENCIES
Robert S. Bonner *In* NASA. Marshall Space Flight Center Proc: Fourth Ann. Workshop on Meteorol. and Environ. Inputs to Aviation Systems Mar. 1980 p 125-129 (For primary document see N81-14555 05-47)
Avail: NTIS HC A13/MF A01 CSCL 04B

The key systems requirements for ceilometer systems are described. The following items are included: range must be 10,000 ft.; laser emission must conform to the bureau of radiological health class I performance; system must detect two lowest cloud layers; display must be in either English or metric units; and system must be capable of self monitoring and testing performance. Based upon the requirements competitive prototype cloud height indicator systems are to be built. R.C.T.

N81-14566*# Aeronautical Systems Div., Wright-Patterson AFB, Ohio.
OBSERVING LIGHTNING FROM GROUND-BASED AND AIRBORNE STATIONS
John C. Corbin, Jr. *In* NASA. Marshall Space Flight Center Proc.: Fourth Ann. Workshop on Meteorol. and Environ. Inputs to Aviation Systems Mar. 1980 p 130-139 refs (For primary document see N81-14555 05-47)
Avail: NTIS HC A13/MF A01 CSCL 04B

The operational designs and performance capabilities of ground-based and airborne lightning detection systems are reviewed. The airborne Stormscope system is described and compared with onboard radar and the lightning detection and ranging system (LDAR). Two examples of difference-in-time-of-arrival systems for detecting spherics from discharges in electrified clouds are described: (1) The LDAR system and (2) Taylor's lightning mapping system. Next, an interferometric system adapted to lightning location is discussed. Finally, systems that are based upon crossed-loop magnetic direction finding principles but which have been refined and improved to accurately locate lightning discharges to ground are reviewed. M.G.

N81-14567*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
AERONAUTICAL CONCERNS AND NATIONAL AERONAUTICS AND SPACE ADMINISTRATION ATMOSPHERIC ELECTRICITY PROJECTS
William W. Vaughan *In its* Proc.: Fourth Ann. Workshop on Meteorol. and Environ. Inputs to Aviation Systems Mar. 1980 p 140-160 (For primary document see N81-14555 05-47)
Avail: NTIS HC A13/MF A01 CSCL 04B

The phenomenology of lightning and lightning measurement techniques are briefly examined with a particular reference to aeronautics. Developments made in airborne and satellite detection methods are reported. NASA research efforts are outlined which cover topics including in-situ measurements, design factors and protection, remote optical and radio frequency measurements, and space vehicle design. M.G.

N81-14568*# Federal Aviation Administration, Washington, D.C. Systems Research and Development Service.
MEASURING WEATHER FOR AVIATION SAFETY IN THE 1980'S
Robert W. Wedan *In* NASA. Marshall Space Flight Center Proc.: Fourth Ann. Workshop on Meteorol. and Environ. Inputs to Aviation Systems Mar. 1980 p 162-167 (For primary document see N81-14555 05-47)
Avail: NTIS HC A13/MF A01 CSCL 04B

Requirements for an improved aviation weather system are defined and specifically include the need for (1) weather observations at all airports with instrument approaches, (2) more accurate and timely radar detection of weather elements hazardous to aviation, and (3) better methods of timely distribution of both pilot reports and ground weather data. The development of the discrete address beacon system data link, Doppler weather radar network, and various information processing techniques are described. M.G.

N81-14569*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
THE 1979 CLEAR AIR TURBULENCE FLIGHT TEST PROGRAM
Edwin A. Weaver *In its* Proc.: Fourth Ann. Workshop on Meteorol. and Environ. Inputs to Aviation Systems Mar. 1980 p 171-179 (For primary document see N81-14555 05-47)
Avail: NTIS HC A13/MF A01 CSCL 04B

A clear air turbulence (CAT) flight test to evaluate and test four different sensors in the detection and measuring of CAT and other meteorological targets that relate to turbulence is

discussed. The primary types of CAT investigated were mountain wave CAT, jetstream CAT, CAT in cirrus clouds, and CAT in frontal wind shears, troughs, and ridges. The sensors included the CO2 pulsed Doppler lidar and three radiometers. One of the radiometers, at a frequency of 55.5 GHz, looked at atmospheric temperature structure. Another, at a frequency of 180.1 GHz, looked at atmospheric water vapor and investigated the feasibility of measuring at the microwave frequency the turbulence features seen in the infrared (IR) frequencies. An IR radiometer at 27 to 33 microns was the fourth sensor. This last device and the temperature structure radiometer worked well at all flight levels. M.G.

N81-14570*# Federal Aviation Administration, Washington, D.C.
VERY SHORT RANGE FORECASTS OF VISIBILITY AND CEILING
Arthur Hilsenrod *In* NASA. Marshall Space Flight Center Proc.: Fourth Ann. Workshop on Meteorol. and Environ. Inputs to Aviation Systems Mar. 1980 p 180-185 refs (For primary document see N81-14555 05-47)
Avail: NTIS HC A13/MF A01 CSCL 04B

The development of methods for the short range forecasting of visibility and ceiling conditions is discussed. Short range forecasts of one hour or less (5 or 30 minutes), immediately after a series of local observations can be expected to be more accurate and reliable than any forecast of more than one hour. These forecasts can be accomplished by the operational implementation of fully automated aviation observation systems and the utilization of statistical techniques such as the Generalized Equivalent Markov model. M.G.

N81-14571*# National Oceanic and Atmospheric Administration, Boulder, Colo. Environmental Research Labs.
THE MICROBURST: COMMON FACTOR IN RECENT AIRCRAFT ACCIDENTS
Fernando Caracena *In* NASA. Marshall Space Flight Center Proc.: Fourth Ann. Workshop on Meteorol. and Environ. Inputs to Aviation Systems Mar. 1980 p 186-200 refs (For primary document see N81-14555 05-47)
Avail: NTIS HC A13/MF A01 CSCL 04B

The phenomenology of one class of strong thunderstorm downdrafts, microbursts, is described. Several aircraft accidents are analyzed in which a microburst was involved and a concept for an early warning wind shear sensor is presented. M.G.

N81-14572*# National Center for Atmospheric Research, Boulder, Colo.
DOCTOR FUJITA'S MICROBURST ANALYSIS AT CHICAGO
John McCarthy *In* NASA. Marshall Space Flight Center Proc.: Fourth Ann. Workshop on Meteorol. and Environ. Inputs to Aviation Systems Mar. 1980 p 201-202 (For primary document see N81-14555 05-47)
Avail: NTIS HC A13/MF A01 CSCL 04B

Doppler radar measurements of an intense wind shear occurance are discussed. The data suggest the presence of an incredibly strong low level jet outflow component of the microburst event, reaching 60 knots only 50 meters above the surface. Evidence also suggests that microbursts more typically occur in very weak thunderstorms that have hardly reached thunderstorm stage. M.G.

N81-14573*# Dayton Univ., Ohio.
CLEAR AIR TURBULENCE FORECASTING TECHNIQUES
John L. Keller *In* NASA. Marshall Space Flight Center Proc.: Fourth Ann. Workshop on Meteorol. and Environ. Inputs to Aviation Systems Mar. 1980 p 203-208 refs (For primary document see N81-14555 05-47)
Avail: NTIS HC A13/MF A01 CSCL 04B

A method to improve clear air turbulence (CAT) forecasting by more effectively using the currently operational rawinsonde (RW) system is discussed. The method is called the Diagnostic Richardson Number Tendency (DRT) technique. The technique does not attempt to use the RW as a direct detector of the turbulent motion or even of the CAT mechanism structure but rather senses the synoptic scale centers of action which provide the energy to the CAT mechanism at the mesoscale level. The DRT algorithm is deterministic rather than statistical in nature, using the hydrodynamic equations (equations of motion) relevant to the synoptic scale. However, interpretation, by necessity, is probabilistic. What is most important with respect to its operational implementation is that this method uses the same input data as currently used by the operational National Meteorological Center prognostic models. M.G.

N81-14574*# Intercon Weather Consultants, Inc., Camp Springs, Md.
THE PROGRAM OF THE TECHNIQUES DEVELOPMENT LABORATORY IN AVIATION WEATHER FORECASTING
William H. Klein *In* NASA. Marshall Space Flight Center Proc.: Fourth Ann. Workshop on Meteorol. and Environ. Inputs to Aviation Systems Mar. 1980 p 209-212 (For primary document see N81-14555 05-47)
Avail: NTIS HC A13/MF A01 CSCL 04B

Some operational and experimental products developed for aviation weather forecasting are briefly described. Experimental products include surface dew point, obstructions to vision, boundary layer model, computer-worded terminal forecasts, terminal alerting procedure, generalized equivalent Markov, and radar forecasts (0-2 hours). M.G.

N81-14575# Weapons Systems Research Lab., Adelaide (Australia).
LOW-SPEED WIND-TUNNEL TESTS OF TWO WEATHER-COCKING SENSORS
D. P. Brown and R. I. Macleod Aug. 1980 29 p refs (WSRL-0171-TM; AR-002-036) Avail: NTIS HC A03/MF A01

Two blunt-nosed weathercocking wind direction sensors, one stabilized by a ring tail and the other by swept cruciform fins, were tested in a low-speed wind tunnel to investigate possible aerodynamic interference between these wind direction sensors and the vehicles in front of which they were to be mounted. In these low speed tests, sensor support shaft diameter and vehicle nose tip geometry both caused significant errors in the ring-tailed sensor's alignment to the free stream when the vehicle was at angle of attack. A disk baffle placed on the shaft behind the sensor base was found to reduce sensor misalignment significantly at small angles of attack. Alignment errors for the cruciform sensor were much smaller than those of the ring-tailed sensor at small angles of attack, and these smaller errors were further reduced when a baffle was placed on the shaft. Author

N81-14576# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany). Abt. Experimentelle Atmoesphaerenphysik 2.
REMOTE SENSING OF WIND SPEED AND DIRECTION BY LASER DOPPLER ANEMOMETER
Friedrich Koepp Oct. 1979 31 p refs In GERMAN; ENGLISH summary
(DFVLR-Mitt-79-18) Avail: NTIS HC A03/MF A01; DFVLR, Cologne DM 6,60

A laser Doppler velocimeter based on CW CO2 lasers and coherent detection technique is described. Wind speed and direction can be measured over large distances without perturbation by the instrument. Some examples demonstrate the manifold applicabilities of the laser Doppler velocimeter. Author

N81-14577# Royal Netherlands Meteorological Inst., De Bilt. Meteorologisch Onderzoek.
SOME CONSIDERATIONS ABOUT WIND PREDICTIONS OVER SEA USING A 'LIMITED AREA MODEL' BASED ON PRIMITIVE EQUATIONS
L. C. Heijboer 1980 19 p refs
(KNMI-V-349) Avail: NTIS HC A02/MF A01

A method for making reliable wind forecasts at sea level for the computations of sea waves, swell and storm surges, which gain their energy from the kinetic energy of the horizontal motion of the wind, is described. Important factors in making short range predictions such as the atmospheric turbulence, mesoscale features, and weather systems, are discussed. T.M.

N81-14578# Helsinki Univ. of Technology, Otaniemi (Finland). Radio Lab.
MICROWAVE SIGNATURES OF SNOW MEASURED IN FINLAND

Martti Tiuri, Martti Hallikainen, Pekka Jakkula, and Henrik Schultz 1978 12 p refs
(Rept-S-109; ISBN-951-751-357-7) Avail: NTIS HC A02/MF A01

Radiometry of ground covered by snow was started in Finland. Two radiometers, operating at 4.8 GHz and at 36.8 GHz, were used for brightness temperature measurements under typical winter and spring conditions in 1978. Results show that the brightness temperature at 36.8 GHz is sensitive to surface wetness, whereas at 4.8 GHz, the inpack properties of snow determine the brightness temperature. ESA

N81-14579# Science Applications, Inc., Monterey, Calif.
THE EASTERN PACIFIC TROPICAL CYCLONE STRIKE PROBABILITY PROGRAM (EPSTRKP) Final Report
Jerry D. Jarrell Aug. 1980 31 p refs
(Contract N62271-79-M-1679)
(AD-A091841; NEPRF-CR-80-03) Avail: NTIS HC A03/MF A01 CSCL 04/2

A system to infer the probability of an eastern Pacific tropical cyclone's striking within an area given a tropical cyclone forecast is described. The probabilities are based on analysis of tropical cyclone forecast errors in the eastern North Pacific. GRA

N81-14580# Wisconsin Univ. - Madison. Space Science and Engineering Center.
STUDIES IN OBJECTIVE FORECASTING OF MESOSCALE WEATHER USING AN INTERACTIVE COMPUTER SYSTEM Annual Report, 15 Jun. 1979 - 15 Jun. 1980
Carlyle H. Wash, Raymond OKeefe, Thomas M. Whittaker, Delain A. Edman, and Donald R. Johnson Hanscom AFB, Mass. AFGL 15 Jun. 1980 78 p refs
(Contract F19628-78-C-0137; AF Proj. 6670)
(AD-A091752; AFGL-TR-80-0309; SR-2) Avail: NTIS HC A04/MF A01 CSCL 04/2

GOES satellite imagery was used in conjunction with surface hourly weather observations in order to ascertain the ability of the satellite data to discriminate thunderstorm occurrence in regions with some cloudiness. Research was also conducted to study the ability of a vertically integrated wind field to correctly advect observed surface frontal features. GRA

N81-14581# Naval Research Lab., Washington, D. C. Applied Ocean Acoustics Branch.
LONG TERM VARIABILITY OF WINDSPEED Interim Report
A. I. Eller and M. L. Blodgett 3 Nov. 1980 25 p refs
(AD-A091802; NRL-8436) Avail: NTIS HC A02/MF A01 CSCL 04/2

Underwater acoustic sensors are subject to interfering ambient noise generated by the action of wind on the sea surface. Noise at frequencies above a few hundred Hz generally shows strong correlation with wind speed. A knowledge of the statistical variability of wind speed is useful for predicting the properties of ambient noise. Values of surface wind speed and atmospheric pressure reported from weather stations at Jan Mayen in the Norwegian Sea and Bear Island in the Barents Sea over a two year period were examined. It was found that the statistical distribution of wind speeds can be represented approximately as a Rayleigh distribution. Spectral analysis of the time series records of wind speed and pressure shows that most of the variability of these parameters is contributed by synoptic scale variations having periods of from a few days to a few weeks. The annual or seasonal variations has the largest single Fourier coefficient but represents only a relatively small part of the total variance. GRA

N81-14582# Texas Univ., El Paso. Dept. of Electrical Engineering.
EXTENDED APPLICABILITY OF OPTICAL WIND SENSING TECHNIQUES Final Report, 1 Jul. 1979 - 31 Aug. 1980
Jack Smith 31 Oct. 1980 65 p refs
(Contract DAAG29-79-C-0072)
(AD-A091606; FRI-80-AR-87; ARO-16654.1-GS) Avail: NTIS HC A04/MF A01 CSCL 14/2

The objectives of the study were to extend the applicability of optical crosswind sensing techniques to allow operation in rain and to determine the feasibility of using the techniques to study water vapor induced fluctuations at millimeter wavelengths. Two field tests were conducted to determine the effects of rain on optical crosswind sensors. The results showed that, (a) temporal filtering of the rain induced noise could improve the optical sensor performance under light rain conditions; (b) a simple frequency measurement of the fluctuating signal yielded a good representation of the wind speed variations; and (c) an improved turbulent signal to rain signal ratio can be obtained by using a receiver array to form a spatial filter. Temporal filtering imposes an upper limit on the speed which can be measured, but spatial filters would not have this limitation. GRA

N81-14583# Naval Environmental Prediction Research Facility, Monterey, Calif.
METEOROLOGICAL FACTORS AFFECTING EVAPORATION DUCT HEIGHT CLIMATOLOGIES Final Report
Wayne Sweet Jul. 1980 37 p refs
(AD-A091665; NEPRF-TR-80-02) Avail: NTIS HC A03/MF A01 CSCL 04/2

Latitudinal and seasonal variations of calculated evaporation duct height climatologies are examined to determine which of the four surface measured input parameters to the calculation of duct height -- air temperature, sea surface temperature, dew point temperature, and wind speed -- has the largest effect on the climatological tendencies. Based on a sensitivity analysis of the four parameters, sea surface temperature appears to cause most of the latitudinal variation. Seasonal variations of median duct height apparently are caused by the stability (indicated by the difference between air and sea surface temperatures) and dew point temperature, and, to a lesser extent, by wind speed. GRA

N81-14584# Naval Ocean Systems Center, San Diego, Calif. Electromagnetic Propagation Div.
SURFACE BASED REMOTE SENSING IN MARINE AIR. EXTENSIVE ANALYSIS OF ECHOES BY SEVERAL SENSORS REVEALS EVOLUTIONARY ATMOSPHERIC PROCESSES RELATED TO WEATHER CAPABLE OF AFFECTING NAVAL OPERATIONS Research Report, Jul. 1971 - Jan. 1980
V. R. Noonkester 1 Aug. 1980 32 p refs
(WR0330200)
(AD-A091518; NOSC/TR-580) Avail: NTIS HC A03/MF A01 CSCL 04/2

Major results of investigations include: (1) Evaluation of the following surface based remote sensors, either singularly, jointly, or separated in several coastal regions--Fixed, vertical pointing FM-CW radar, Mobile, scanning FM-CW radar, Acoustic monostatic echosounder, Acoustic, bistatic wind sensing system, Lidar, High powered pulsed radar, and Ceilometer using nonstandard film recording technique; (2) Determination of advantages and complementary features of sensors; (3) Identification of echoes and their evolution related to significant meteorological processes potentially affecting naval operations--Temperature and relative humidity inversion base height, Stratus cloud top, Echo structure, including drizzle, beneath stratus clouds leading to fog formation, Turbulence related to waves, forced and free convection, and aircraft wing-tip vortices, and Extrapolation of ascending convective mixing layer depth to condensation level where clouds form and descending subsidence inversion base or wind shear region into and through stratus clouds or fog deck to instigate cloud/fog dissipation; and (4) Development of echo coding technique for transmitting essential echo features and acquiring an echo climatology. GRA

N81-14585# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio.
LATENT HEAT INDUCED DIVERGENCE AND THE ULTRA-LONG WAVES OF THE SUBTROPICS AND MIDLATITUDES Ph.D. Thesis - Utah Univ.
Fred Parker Lewis Dec. 1979 281 p refs
(AD-A091408; AFIT-CI-79-268D) Avail: NTIS HC A13/MF A01 CSCL 04/2

Winter and summer Goddard Institute of Space Studies (GISS) Data System Test (DST) (prototype Global Atmospheric Research Project (GARP) data) time average fields are compared with several average data sets. An analysis of the GISS DST data involving kinematically and noneliptically computed divergent flow fields suggests that the positioning of the subtropical jets and

ultra long waves (wavenumbers 1-3) may be partially in response to strong longitudinal variations in tropical convective heating. Experiments with divergent barotropic and two level primitive equation models are used to test the short (1-3 days) and long (15-30 days) range effects of large scale tropical heating patterns upon the subtropical and midlatitude long and ultra long waves and flow patterns. The barotropic model experiments suggest that forcing in the tropics of one hemisphere can significantly accelerate (by means of gravity wave energy propagation) the opposite hemisphere subtropical jet in a matter of one of three day's time, regardless of easterly or westerly tropical flow. The maximum subtropical jets due to forcing in one hemisphere are shown to exist in the opposite hemisphere. Two level primitive equation model experiments are conducted for the spherical earth with uniform mid and high latitude net diabatic forcing. GRA

N81-14586# Northrop Services, Inc., Huntsville, Ala.
SITE INSOLATION AND WIND POWER CHARACTERISTICS: TECHNICAL REPORT MIDWEST REGION
Aug. 1980 220 p refs 6 Vol.
(Contract DE-AC01-77ET-20160)
(DOE/CS-20160-01-Vol-4) Avail: NTIS HC A10/MF A01

Selected insolation and windpower conditions were investigated for their occurrence and persistence, for defined periods of time, on a monthly basis. Hourly solar insolation and collateral meteorological information was gathered from 22 National Weather Service stations. These stations were in the states of North Dakota, South Dakota, Nebraska, Kansas, Missouri, Iowa, Minnesota, Wisconsin, Illinois, Michigan, Indiana, and Ohio. The information gathered is used for site selections of solar generators and windpowered generators. T.M.

N81-14587# Northrop Services, Inc., Huntsville, Ala.
SITE INSOLATION AND WIND POWER CHARACTERISTICS: TECHNICAL REPORT WESTERN REGION (SOUTH SECTION)
Aug. 1980 221 p refs
(Contract DE-AC01-77ET-20160)
(DOE/CS-20160-01-Vol-6) Avail: NTIS HC A10/MF A01

Estimates of future trends in the parameters affecting the utilization of windpower and solar energy are presented. Selected insolation and windpower conditions were monitored on an hourly basis at 22 National Weather Service stations. These stations are located in California, Nevada, Utah, Arizona, Colorado, and New Mexico. The estimates are used in site selections for windpowered generators and solar generators. T.M.

N81-14588# Northrop Services, Inc., Huntsville, Ala.
SITE INSOLATION AND WIND POWER CHARACTERISTICS: TECHNICAL REPORT WESTERN REGION (NORTH SECTION)
Aug. 1980 213 p refs
(Contract DE-AC01-77ET-20160)
(DOE/CS-20160/01-Vol-5) Avail: NTIS HC A10/MF A01

Hourly measurements of solar insolation and other meteorological parameters were gathered at 21 National Weather Service stations. These stations are located in Alaska, Washington, Oregon, Idaho, Montana, and Wyoming. The data is used to provide an estimate of future trends in the parameters affecting the utilization of windpower and solar energy. Solar data are global radiation incident on a horizontal surface and wind data represent windpower normal to the air flow. T.M.

N81-14589# Northrop Services, Inc., Huntsville, Ala.
SITE INSOLATION OF WIND POWER CHARACTERISTICS: SOUTHERN REGION Technical Report
Aug. 1980 270 p refs
(Contract DE-AC01-77ET-20160)
(DOE/CS-20160/01-Vol-3) Avail: NTIS HC A12/MF A01

Site Insolation and Wind Power Characteristics studies were performed to provide statistical information on the expected future availability of solar and wind power at various sites in the Southern Region of the U.S. Historic data at 28 National Weather Service stations with hourly solar insolation and collateral meteorological information, were interrogated to provide an estimate of future trends. Selected insolation and wind power conditions were investigated for their occurrence and persistence, for defined periods of time, on a monthly basis. Global horizontal insolation are related to inclined surfaces at each site. Ratios are provided, monthly, for multiplying global insolation to obtain insolation estimates on south-facing surfaces inclined at different angles with respect to the horizontal. Also, joint probability distribution tables are constructed showing the number of occurrences, out of a finite sample size, of daily average solar and wind power within selected intervals, by month. Author

N81-14590# Oregon State Univ., Corvallis. Dept. of Atmospheric Sciences.
SOLAR ENERGY METEOROLOGICAL RESEARCH AND TRAINING SITE, REGION 5 Annual Report, 1 Oct. 1978 - 30 Sep. 1979
C. R. NagarajaRao and E. Wendell Hewson Mar. 1980 32 p
(Grant EY-77-G-06-1059)
(DOE/ET-20172; AR-2) Avail: NTIS HC A03/MF A01

The program provides a comprehensive solar radiation and related meteorological data base that is used to formulate a complete description of the solar radiation climatology of the region. Hourly values of direct and global irradiations are measured and recorded with a six-channel microprocessor-based data acquisition system. Lists of the various parameters measured, the sensors and methods used, and the instrument locations are presented. T.M.

N81-14591# Brown Univ., Providence, R. I. Dept. of Geological Sciences.
GLOBAL TEMPERATURE PATTERNS 6000 YEARS AGO Progress Report, 1 Mar. 1979 - 29 Feb. 1980
Thompson Webb, III 1980 41 p ref
(DOE/EV-100097/1) Avail: NTIS HC A03/MF A01

It is planned to map the patterns in selected climatic variables of the Northern Hemisphere at 5000 to 7000 years ago that can be reconstructed from pollen and marine plankton data. Research during the first eight months was focused on assembling the available modern and fossil data from each of the main areas under study. L.F.M.

N81-14592# Savannah River Ecology Lab., Aiken, S. C.
AUTOMATED EMERGENCY METEOROLOGICAL RESPONSE SYSTEM
D. W. Pepper 1980 25 p refs Presented at Natl. Petrol. Refiners Assoc. Conf., Philadelphia, 16-19 Nov. 1980
(Contract DE-AC09-76SR-00001)
(DP-MS-80-81; CONF-801122-1) Avail: NTIS HC A02/MF A01

The system was developed to aid in the evaluation of accidental releases of hazardous materials from the Savannah River Plant to the environment. A minicomputer system collects and archives data from both onsite meteorological towers and the National Weather Service. In the event of an accidental release, the computer rapidly calculates the trajectory and dispersion of pollutants in the atmosphere. Computer codes have been developed which provide a graphic display of predicted concentration profiles downwind from the source, as functions of time and distance. DOE

N81-14593# Pennsylvania State Univ., University Park. Dept. of Meteorology.
STATISTICS OF WIND FLUCTUATIONS OVER COMPLEX TERRAIN Final Report
John A. Dutton, Hans A. Panofsky, David Larko, Hampton N. Shirer, Gregory Stone, and Michael Vilardo Oct. 1979 157 p refs
(Contract DE-AS06-78ET-20560)
(DOE/ET-20560/1) Avail: NTIS HC A08/MF A01

The properties of relative turbulence intensities, turbulent spectra, and frequency distributions at the atmospheric boundary layer are discussed. Excessive vertical wind shears were found on top of a steep escarpment. These were approximately in equilibrium with intensities of local velocity fluctuations, so that relative turbulence intensities reached 80% and more. Models were constructed for normalized logarithmic spectra of the velocity components over uniform terrain. T.M.

N81-14594# Atmospheric Sciences Lab., White Sands Missile Range, N. Mex.

METEOROLOGICAL MEASUREMENT SYSTEM FOR SUPPORT OF ATMOSPHERIC PROPAGATION STUDIES

John Hines and Gail Bingham (California Univ., Livermore, Lawrence Livermore Lab.) 1980 9 p Presented at Workshop on Millimeter and Submillimeter Atmospheric Propagation Applicable to Radar and Missile Systems, Redstone Arsenal, Ala., 22 Mar. 1979 Submitted for publication
(Contract W-7405-eng-48)
(UCRL-84547; CONF-8003101-1) Avail: NTIS HC A02/MF A01

A laser system for meteorological data acquisition, transmission, and processing was designed, developed, and implemented. The system covers optical turbulence, wind, gases, and particulates. The system is used to characterize the atmosphere at a high energy laser facility. Optical turbulence instrumentation includes point measurements with a spatial temperature probe, integrated measurements over a 180 m horizontal path with an optical scintillometer, and vertical profiles up to 600 m with an acoustic sounder. Wind speed and direction are monitored with an anemometer system. Gases currently being monitored for concentration include water vapor, ozone, total hydrocarbons, methane, nitrous oxide, and carbon dioxide. Particulate measurements include those of size distribution, mass concentration, and scattering coefficient. DOE

N81-14595# National Weather Service, Fort Worth, Tex. Scientific Services Div.

AN AUTOMATED PROCEDURE FOR COMPOSITION OF SEVERE WEATHER WATCH AREAL REDEFINING STATEMENTS

Gordon A. Hammons Feb. 1980 24 p ref
(PB80-225584; NOAA-TM-NWS-SR-100; NOAA-80073105) Avail: NTIS HC A02/MF A01 CSCL 04B

A FORTRAN program (REDEFINE) was developed to produce Redefining Statements automatically. A redefining statement plots the area effected by a tornado or severe thunderstorm watch. The program is briefly described and its use outlined. J.M.S.

N81-14596# National Weather Service, Fort Worth, Tex.

THREE-HOUR RAINFALL REQUIRED FOR FLASH FLOODING ON SMALL STREAMS

William E. Fox (Southeast River Forecast Center, Atlanta, Ga.) Apr. 1980 18 p
(PB80-225576; NOAA-TM-NWS-SR-101; NOAA-80073104) Avail: NTIS HC A02/MF A01 CSCL 04B

Each morning the Southeast River Forecast Center (SERFC) in Atlanta issues flash flood rainfall guidance values for use by Weather Forecast Offices and Weather Service Offices in Florida, Alabama, Georgia, North, and South Carolina. The guidance contains forecasts for the 3 hour rainfall required for flashflooding on small streams within meteorological forecast zone. The 3 hour rainfall values are transmitted in the morning, based on soil moisture conditions as of 7 am. There are two reasons why rainfall occurring over a period of time longer than 3 hours can cause flooding on small streams, even though the required 3 hour value is not exceeded at any time during the longer rainfall duration. The primary season is that water from previous rain is still in the channel when subsequent rainfall occurs. A secondary reason for the greater effect of subsequent rainfall is the curvilinear relationship between rainfall excess and storm runoff. As rainfall continues and the accumulated rainfall excess increases, the runoff from an additional increment of rainfall is greater as the storm continues. GRA

N81-14597# National Weather Service, Salt Lake City, Utah.

AN AUTOMATIC LIGHTNING DETECTION SYSTEM IN NORTHERN CALIFORNIA

James A. Rea and Chris E. Fontana Jun. 1980 25 p refs
(PB80-225592; NOAA-TM-NWS-WR-153; NOAA-80073106) Avail: NTIS HC A02/MF A01 CSCL 04B

IN 1977, Automatic Lightning Detection System Direction Finder (ALDS DF) units were installed at Susanville, California, and Lakeview, Oregon, as part of the Great Basin ALDS. The ALDS is capable of detecting and locating cloud to ground lighting discharges over considerable areas. The performance and capabilities of the ALDS are described in relation to radar coverage, satellite imagery, and actual lightning fire starts during the 1979 fire season in northern California. GRA

N81-14598# National Hurricane Center, Coral Gables, Fla.

ANNUAL DATA AND VERIFICATION TABULATION ATLANTIC TROPICAL CYCLONES 1979

Paul J. Hebert Jun. 1980 84 p refs
(PB80-226301; NOAA-TM-NWS-NHC-13; NOAA-80073103; AR-6) Avail: NTIS HC A05/MF A01 CSCL 04B

Tropical cyclone warning lead times for U.S. land-falling storms are given. A summary of the best track, initial position, and forecast positions for named storms is presented. Other data include supplementary vortex messages, aerial reconnaissance summaries, daily GEOS-2 satellite photographs, and selected radar photographs of hurricanes Bob, David, and Frederic. T.M.

N81-14599# National Weather Service, Kansas City, Mo.

A COMPUTER PROGRAM FOR DETERMINING AND DISPLAYING THE GEOSTROPHIC WINDS ON LAKES SUPERIOR AND MICHIGAN

Robert L. Somrek Jun. 1980 27 p
(PB80-225675; NOAA-NWS-CRCP-1) Avail: NTIS HC A03/MF A01 CSCL 04B

The geostrophic wind has long been recognized as a useful tool for the forecaster. It particularly useful in estimating the wind over large areas such as the Great Lakes where few or no reports are available. A semigraphical solution of the geostrophic wind equation was used by WSFO Chicago as an aid in analyzing and forecasting winds on Lakes Superior and Michigan. GRA

N81-14600# National Oceanic and Atmospheric Administration, Boulder, Colo. Wave Propagation Lab.

A CROSSWIND MEASUREMENT MODULE FOR THE MODEL 2 OPTICAL C SUB n-2 INSTRUMENT

G. R. Ochs and W. D. Cartwright Feb. 1980 18 p refs Prepared for Atmospheric Sciences Lab., White Sands, Missile Range, New Mexico
(PB80-217607; NOAA-TM-ERL-WPL-53; NOAA-80071701) Avail: NTIS HC A02/MF A01 CSCL 04B

This instruction book describes a crosswind measurement module which attaches directly to the Model 2 Optical Cn squared instrument. Operating instructions, shipment procedures, and circuit diagrams are included. GRA

48 OCEANOGRAPHY

Includes biological, dynamic and physical oceanography; and marine resources.

N81-14601*# EG and G Washington Analytical Services Center, Inc., Pocomoke City, Md.

CATALOG OF SEA STATE AND WIND SPEED IN THE SOUTH ATLANTIC BIGHT

J. D. McMillan Jan. 1980 134 p refs
(Contract NAS6-2639)
(NASA-CR-156872) Avail: NTIS HC A07/MF A01 CSCL 08C

The GEOS 3 significant waveheight and ground wind speed estimation algorithms are derived and then applied to all GEOS 3 data in the South Atlantic Bight. The investigation area is divided into five geographical sectors and significant waveheight and wind speed histograms are presented in each sector by month and by season. In the discussion of the histograms, definite seasonal trends are identified and examined. Author

N81-14602# Royal Netherlands Meteorological Inst., De Bilt. Oceanografisch Onderzoek.

PRELIMINARY RESULTS ON A COMPARISON OF SHALLOW WATER WAVE PREDICTIONS

E. Bouws, B. W. Golding (Meteorology Office, Bracknell, England), G. J. Komen, H. H. Peeck, and M. J. M. Saraber Apr. 1980 34 p refs
(KNML-WR-80-5) Avail: NTIS HC A03/MF A01

Predictions from two different wave models on wave height, low frequency wave height, wind speed and wind direction, are compared with observations. The comparison was made for the month of December 1979 and for three different locations in the southern North Sea. Author

N81-14603# Hawaii Univ., Honolulu.
INTERNAL TIDES AND INERTIAL OSCILLATIONS AS INFERRED FROM CURRENT AND TEMPERATURE MEASUREMENTS IN THE EQUATORIAL PACIFIC Final Technical Report
Lorenz Magaard 1980 64 p refs
(Grant NOAA-04-78-B01-15)
(PB80-225568; NOAA-80072802) Avail: NTIS HC A04/MF A01 CSCL 08C

Time series of temperature and horizontal velocity from a single mooring in the equatorial Pacific were studied. After determination and elimination of the barotropic components, in particular those of the tides and of the inertial current, the cross spectra of the remaining baroclinic fluctuations were analyzed. It was found that the class of vertically standing, horizontally propagating internal gravity wave models was consistent with these fluctuations. Several simple models of this class were fitted to the data. GRA

N81-14604# Dartmouth Coll., Hanover, N.H. School of Engineering.
AN EXPLICIT MODEL FOR TWO-DIMENSIONAL TIDAL CIRCULATION USING TRIANGULAR FINITE ELEMENTS: WAVETL USER'S MANUAL Final Report
Daniel R. Lynch and William G. Gray (Princeton Univ., N.J.) Aug. 1980 73 p refs
(PB80-226046; USGS/WRI-80/42; USGS/WRD/WRI-80/047) Avail: NTIS HC A04/MF A01 CSCL 08C

The program is based on the wave equation form of the governing equations, which was shown to be superior to other comparable models based on the primitive shallow water equations. The model uses linear triangular finite elements. No matrix inversions or manipulations are required, resulting in substantial savings in computer storage requirements and execution time. GRA

51 LIFE SCIENCES (GENERAL)

Includes genetics.

N81-14605* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
MICRO-FLUID EXCHANGE COUPLING APPARATUS Patent
John E. Johnson, Jr. (San Francisco Univ.) and Paul F. Swartz, inventors (to NASA) Issued 15 Jul. 1980 6 p Filed 16 Oct. 1978 Supersedes N78-33717 (16 - 24, p 3257)
(NASA-Case-ARC-11114-1; US-Patent-4,212,297; US-Patent-Appl-SN-951422; US-Patent-Class-128-207.14; US-Patent-Class-128-204.18; US-Patent-Class-128-207.28; US-Patent-Class-128-DIG.26; US-Patent-Class-128-236; US-Patent-Class-128-DIG.6; US-Patent-Class-128-DIG.9; US-Patent-Class-128-DIG.12; US-Patent-Class-128-DIG.16) Avail: US Patent and Trademark Office CSCL 06B

In a macro-fluid exchange, a hollow needle, such as a syringe needle, is provided for penetrating the fluid conduit of the animal. The syringe needle is coupled to a plenum chamber having an inlet and outlet port. The plenum chamber is coupled to the syringe needle via the intermediary of a standard quick disconnect coupling fitting. The plenum chamber is carried at the end of a drive rod which is coupled to a micrometer drive head. The micrometer drive head is slidably and pivotably coupled to a pedestal for adjusting the height and angle of inclination of the needle relative to a reference base support. The needle is positioned adjacent to the incised trachea or a blood vessel of a small animal and the micrometer drive head is operated for penetrating the fluid conduit of the animal.
Official Gazette of the U.S. Patent and Trademark Office

N81-14606*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
NALOXONE INHIBITS AND MORPHINE POTENTIATES THE ADRENAL STEROIDOGENIC RESPONSE TO ACTH
John P. Heybach and Joan Vernikos Dec. 1980 17 p refs
(NASA-TM-81253; A-8416) Avail: NTIS HC A02/MF A01 CSCL 06P

The adrenal actions were stereospecific since neither the positve stereojsomer of morphine, nor that of naloxone, had any effect on the adrenal response to exogenous adrenocorticotrophic hormone (ACTH). The administration of human beta endorphin to phyophysectomized rats had no effect on the adrenal corticosterone concentration nor did it alter the response of the adrenal gland to ACTH. These results indicate that morphine can potentiate the action of ACTH on the adrenal by a direct, stereospecific, dose dependent mechanism that is prevented by naloxone pretreatment and which may involve competition for ACTH receptors on the corticosterone secreting cells of the adrenal cortex. Author

N81-14607# Martin Marietta Corp., Baltimore, Md.
PHOTOCHEMISTRY AND ENZYMOLOGY OF PHOTOSYNTHESIS Progress Report, 1 Nov. 1979 - 31 Mar. 1980
Richard Radmer, John Golbeck, and Bruno Velthuys Apr. 1980 11 p
(Contract DE-AC02-76ER-3326)
(DOE/ER-03326/90) Avail: NTIS HC A02/MF A01

Several specific topics concerning the photochemistry and enzymology of photosynthesis are discussed. Results from experiments investigating light harvesting and electron transport in C4 plants affirm that bundle sheath chloroplasts are deficient in photosystem 2 compared to those of the mesophyll. In addition, the use of a mass spectrometer inlet system to study photosynthetic O2 evolution with O-18 labeled substrates is described. An investigation of action of the copper chelator, salicylaldoxime, on electron transport reactions is also discussed. Finally, the extraction of two enzymes containing polyphenol oxidase activity from the thylakoid membranes of spinach chloroplasts is reported. M.G.

N81-14608# Woods Hole Oceanographic Institution, Mass.
BIOENGINEERING ASPECTS OF INORGANIC CARBON SUPPLY TO MASS ALGAL CULTURES Final Report
Joel C. Goldman Jun. 1980 104 p refs
(Contract DE-AC02-78ET-20604)
(DOE/ET-20604/1) Avail: NTIS HC A06/MF A01

The inorganic carbon requirements of microalgae under mass culture conditions are discussed. A literature review on the inorganic carbon chemical system in relation to algal growth requirements is given and the kinetics of inorganic carbon-limited growth of two freshwater chlorophytes is discussed including the effect of carbon limitation on cellular chemical composition. M.G.

N81-14609# InterTechnology Solar Corp., Warrenton, Va.
PRESSURE HARVESTING OF MICROALGAE Final Report
30 May 1980 34 p refs
(Grant NSF DAR-79-17457)
(PB80-221781; ITC/S-300580; NSF/RA-800151) Avail: NTIS HC A03/MF A01 CSCL 08M

The feasibility of widespread usage of microalgae for food material, wastewater reclamation, energy conversion, and fertilizer production depends upon the development of an efficient, low cost harvesting method. Consequently, the application or reduction of pressure in a closed system to concentrate the algae was examined, especially because some types of algae have vacuoles of gas. Upon increasing or decreasing the pressure, these vacuoles are either compressed of expanded like a bubble, thereby moving the algae to near the bottom or the top of the container, where a concentrated stream could be drawn off. To determine the applicability of this technique, preliminary basic tests were performed. GRA

N81-14610# Michigan Univ., Dearborn. Great Lakes Research Div.
PHYTOPLANKTON COMPOSITION AND ABUNDANCE IN SOUTHERN LAKE HURON Final Report, 1974 - 1976
E. F. Stoermer and R. G. Kreis, Jr. Jul. 1980 398 p refs
(Grant EPA-R-803086)
(PB80-216013; EPA-600/3-80-061) Avail: NTIS HC A17/MF A01 CSCL 08H

Southern Lake Huron contains a diversity of phytoplankton assemblage types ranging from assemblages characteristic of oligotrophic waters to those which usually occur under highly

eutrophic conditions. The offshore waters are generally characterized by oligotrophic associations and most eutrophic associations are associated with the Saginaw Bay interface waters. Under certain conditions, populations which are generated within Saginaw Bay are found mixed with offshore assemblages, apparently as a result of passive dispersal. The most widely dispersed populations include nuisance producing blue green algae such as Aphanizomenon flos-aquae. During the period of study, floristic modification resulting from inputs from Saginaw Bay was usually found along the Michigan coast south of the bay, but cases were noted where greatest effect was found at stations north of the bay or eastward into the open lake. GRA

52 AEROSPACE MEDICINE

Includes physiological factors, biological effects of radiation; and weightlessness.

N81-14611* National Aeronautics and Space Administration, Washington, D. C.
AEROSPACE MEDICINE AND BIOLOGY: A CONTINUING BIBLIOGRAPHY WITH INDEXES, SUPPLEMENT 212
Nov. 1980 54 p
(NASA-SP-7011(212)) Avail: NTIS HC A04 CSCL 06E

A bibliography listing 146 reports, articles, and other documents introduced into the NASA scientific and technical information system is presented. The subject coverage concentrates on the biological, psychological, and environmental factors involved in atmospheric and interplanetary flight. Related topics such as sanitary problems, pharmacology, toxicology, safety and survival, life support systems, and exobiology are also given attention. M.G.

N81-14612* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
SUBCUTANEOUS ELECTRODE STRUCTURE Patent
Gordof F. Lund, inventor (to NASA) (NAS-NRC) Issued 26 Aug. 1980 5 p Filed 16 Jan. 1979 Supersedes N79-15576 (17-06, p 0765) Sponsored by NASA
(NASA-Case-ARC-11117-1; US-Patent-4,219,027; US-Patent-Appl-SN-003693; US-Patent-Class-128-642) Avail: US Patent and Trademark Office CSCL 06B

A subcutaneous electrode structure suitable for a chronic implant and for taking a low noise electrocardiogram of an active animal, comprises a thin inflexible, smooth disc of stainless steel having a diameter as of 5 to 30 mm, which is sutured in place to the animal being monitored. The disc electrode includes a radially directed slot extending in from the periphery of the disc for approximately 1/3 of the diameter. Electrical connection is made to the disc by means of a flexible lead wire that extends longitudinally of the slot and is woven through apertures in the disc and held at the terminal end by means of a spot welded tab. Within the slot, an electrically insulative sleeve, such as silicone rubber, is placed over the wire. The wire with the sleeve mounted thereon is captured in the plane of the disc and within the slot by means of crimping tabs extending laterally of the slot and over the insulative wire. The marginal lip of the slot area is apertured and an electrically insulative potting material such as silicone rubber, is potted in place overlaying the wire slot region and through the apertures.

Official Gazette of the U.S. Patent and Trademark Office

N81-14613* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
INDOMETH ACIN-ANTIHISTAMINE COMBINATION FOR GASTRIC ULCERATION CONTROL Patent
Patricia A. Brown (San Jose State Univ.) and Joan Vernikos, inventors (to NASA) (San Jose State Univ.) Issued 28 Oct. 1980 8 p Filed 29 Dec. 1978 Supersedes N79-14755 (17-05, p 0646) Continuation-in-part of US Patent Appl. SN-850504, filed 10 Nov. 1977 Sponsored by NASA
(NASA-Case-ARC-11118-2; US-Patent-4,230,717; US-Patent-Appl-SN-974476; US-Patent-Appl-SN-850504; US-Patent-Class-424-274) Avail: US Patent and Trademark Office CSCL 06E

An anti-inflammatory and analgesic composition containing indomethacin and an H2 histamine receptor antagonist in an amount sufficient to reduce gastric distress caused by the indomethacin was developed. Usable antagonists are metiamide and cimetidine.

Official Gazette of the U.S. Patent and Trademark Office

N81-14614*# Technology, Inc., Houston, Tex. Life Sciences Div.
METABOLIC RATE MEASUREMENT SYSTEM
Kenneth Koester and William Crosier 3 Jun. 1980 61 p
(Contract NAS9-14880)
(NASA-CR-160893) Avail: NTIS HC A04/MF A01 CSCL 06B

The Metabolic Rate Measurement System (MRMS) is an uncomplicated and accurate apparatus for measuring oxygen consumption and carbon dioxide production of a test subject. From this one can determine the subject's metabolic rate for a variety of conditions, such as resting or light exercise. MRMS utilizes an LSI/11-03 microcomputer to monitor and control the experimental apparatus. Author

N81-14615*# California Univ., San Francisco. Dept. of Radiology.
COMPUTERIZED TOMOGRAPHIC DETERMINATION OF SPINAL BONE MINERAL CONTENT Final Report
Christopher E. Cann and Harry K. Genant 14 Sep. 1980 24 p refs
(Contract NAS9-15887)
(NASA-CR-160891) Avail: NTIS HC A02/MF A01 CSCL 06P

The aims of the study were three-fold: to determine the magnitude of vertebral cancellous mineral loss in normal subjects during bedrest, to compare this loss with calcium balance and mineral loss in peripheral bones, and to use the vertebral measurements as an evaluative criterion for the C12MDP treatment and compare it with other methods. The methods used are described and the results from 14 subjects are presented. T.M.

N81-14616# National Physical Lab., Teddington (England). Acoustics Unit.
TABLES RELATING PURE-TONE AUDIOMETRIC THRESHOLD TO AGE
M. S. Shipton Nov. 1979 107 p refs
(NPL-AC-94) Avail: NTIS HC A06/MF A01

Data from the literature on presbyacusis were critically evaluated and a formula was derived for generating the age effect of otologically screened groups of males and females for pure tone frequencies from 0.125 to 12 kHz. Tables show the age correction for males and females in one year steps from 20 to 70 years of age for the fractiles 0.01 to 0.99 at the audiometric frequencies 0.125 to 8 kHz. A.R.H.

N81-14617# Stichting Mathematisch Centrum, Amsterdam (Netherlands). Dept. of Applied Mathematics.
NERVE IMPULSE PROPAGATION IN A BRANCHING NERVE SYSTEM: A SIMPLE MODEL
J. P. Pauwelussen Jul. 1980 55 p refs Submitted for publication
(MC-TW-203/80) Avail: NTIS HC A04/MF A01; Stichting Math. Centrum, Amsterdam FL 6

Local spatial changes of nerve axon geometry such as diameter increase and branching, may cause that action potential waves approaching a region of geometric change fail to propagate beyond it. This effect was examined for a special kind of nonuniformity within the framework of a simple model: an initial value problem for a single nonlinear diffusion equation on an unbounded domain. Author

N81-14618# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany). Abt. Experimentalle Atmosphaerenphysik 2.
A LITERATURE STUDY ON VISUAL MOTION ACCUITY (MINIMUM PERCEPTIBLE MOVEMENT)
Ruediger H. Buell Apr. 1980 130 p refs In GERMAN; ENGLISH summary
(DFVLR-Mitt-80-06) Avail: NTIS HC A07/MF A01; DFVLR, Cologne DM 22,80

On flights according to visual flight rules, minimum visual perceptible movement is in certain conditions an important factor for a pilot's estimation of the danger of collision. Many single results are presented. The dependence of minimum perceptible movement on the following parameters is dominating: angular distance between direction to test object and line of sight, environmental structure, movement exposure time, luminance. Author

N81-14619# Air Force Academy, Colo. Dept. of Behavioral Sciences and Leadership.
PROCESSING OF SEQUENTIAL AND HOLISTIC STIMULI IN LEFT AND RIGHT VISUAL FIELDS
Eugene H. Galluscio, David A. Deras, and Daniel Plavney Oct. 1980 26 p refs
(AD-A091588; USAFA-TR-80-19) Avail: NTIS HC A03/MF A01 CSCL 05/10

The two halves of the brain differ in their functional capabilities. This research project evaluates the ability of two sides of the brain to process information presented in the visual periphery. Visual stimuli requiring parallel and serial processing were viewed parafoveally. The subjects were required to respond using either a manual response button or a bite switch. The data show that the response mode affects which processing style is used which in turn determines which half of the brain is used to process the information. The data suggest that with the bite switch response mode stimuli presented in the right visual field are processed more rapidly and accurately than in the left field. With a manual response, the opposite field effects were seen. The data are discussed as they relate to visual processing in complex work environments, such as aircraft cockpits. GRA

N81-14620# School of Aerospace Medicine, Brooks AFB, Tex. Aerospace Medical Div.
CREW STRESS AND FATIGUE IN THE PAVE Final Report, Jun. 1978 - Dec. 1979
Patrick J. Dowd and Frank H. Brunstetter (ARRS/SG, Scott AFB, Ill.) Jul. 1980 35 p refs
(AF Proj. 7930)
(AD-A091668; SAM-TR-80-26) Avail: NTIS HC A03/MF A01 CSCL 06/19

The purpose of the PAVE LOW III system is to demonstrate that helicopter crews can perform combat rescue at night and in marginal weather conditions. This report discusses the PAVE LOW III system crew stress and fatigue and human factors problems encountered during combat simulated exercises. From the subjective fatigue (SF) data and self-report rating scales it appears that the system significantly stressed experienced test pilots. Workload was extremely demanding of pilot attention, skill, and alertness during terrain following/terrain avoidance, approach to hovering, and hovering maneuvers. It is recommended that the maximum flying time should be no more than 6 hours for these types of missions, and there should be at least 8 hours of uninterrupted sleep or 12 hours of crew rest between missions. Attention should be given to improving the following features: seating, acoustic insulation, display illumination, maps and holders, and communication and ventilation systems. GRA

N81-14621# Los Alamos Scientific Lab., N. Mex.
AUTOMATED MEDICAL INFORMATION SYSTEM OF THE LOS ALAMOS SCIENTIFIC LABORATORY
Gerald D. Eagan and Robert S. Grier 1980 5 p refs Presented at Symp. on Computer Applications in Medical Care, Washington, D. C., 7-8 Nov. 1980
(LA-UR-80-2160; CONF-801109-1) Avail: NTIS HC A02/MF A01

The Medical Information System (MIS) at the Los Alamos Scientific Laboratory automates the acquisition, storage, and retrieval of medical information concerning the nine thousand project connected personnel. The MIS incorporates an on-line, interactive medical history questionnaire, mark sense form processing, and automated coronary risk assessment in the medical evaluation process. Also, MIS has created the ability for long-term study and comparison of employee health as well as made the physican's time more effective. DOE

N81-14151*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
AN INTEGRATIVE APPROACH TO SPACE-FLIGHT PHYSIOLOGY USING SYSTEMS ANALYSIS AND MATHEMATICAL SIMULATION
Joel I. Leonard (Management and Technical Services, Houston, Tex.), Ronald J. White (Management and Technical Services, Houston, Tex.), and John A. Rummel *In its* The 11th Space Simulation Conf. 1980 p 149-162 refs (For primary document see N81-14138 05-31)
(Contracts NAS9-11657; NAS9-12932; NAS9-14192; NAS9-14523; NAS9-15487)
Avail: NTIS HC A19/MF A01 CSCL 06P

53 BEHAVIORAL SCIENCES

Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

N81-14622# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Hamburg (West Germany). Abt. Luftfahrtpsychologie.
CHANGES OF PSYCHOMETRIC COEFFICIENTS AND FACTOR STRUCTURE AS A FUNCTION OF TEST PRACTICE Ph.D. Thesis - Hamburg Univ.
Klaus-Martin Goeters Apr. 1980 153 p refs In GERMAN; ENGLISH summary Report will also be announced as translation (ESA-TT-686)
(DFVLR-FB-80-15; TT-686) Avail: NTIS HC A08/MF A01; DFVLR, Cologne DM 30.50

The performance increments generated by practice, result in changes of the mean which are coupled with similar changes of variance. Depending on the type of scale the changes showed systematic increment (e.g., with number of correct answers as measurement) or systematic decrement (e.g., with solution time as measurement). Coefficients of variation were mostly constant. In every case the reliability increased. It was also shown that the specific factor which is extracted by taking Fleishman's paradigm is no practice factor in the sense of new factorial variance. This factor seems to be a methodological artifact, because test variance stayed relatively homogeneous with practice. Author

N81-14623*# New Mexico Univ., Albuquerque. Technology Application Center.
STRESS FACTORS ON PILOT PERFORMANCE. CITATIONS FROM THE INTERNATIONAL AEROSPACE ABSTRACTS DATA BASE Progress Report, 1974 - May 1980
Gerald F. Zollars Jul. 1980 59 p Supersedes NTIS/PS-79/0506 Sponsored by NASA and NTIS
(NASA-CR-163836; P880-814023; NTIS/PS-79/0506) Avail: NTIS HC $30.00/MF $30.00 CSCL 05I

The cited articles from the international literature cover all aspects of stress factors on pilot performance. Included are articles on biological aspects of flight stress, psychophysiology, acceleration stresses, flight fitness, and physiological effects and responses. This updated bibliography contains 185 citations, 85 of which are new entries to the previous edition. GRA

54 MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT

Includes human engineering; biotechnology; and space suits and protective clothing.

N81-14624*# Hamilton Standard, Windsor Locks, Conn.
DEVELOPMENT OF A PREPROTOTYPE SABATIER CO2 REDUCTION SUBSYSTEM Final Report
Gilbert N. Kleiner and Philip Birbara Aug. 1980 174 p
(Contract NAS9-15470)
(NASA-CR-160885; SVHSER-7221) Avail: NTIS HC A08/MF A01 CSCL 06K

A preoprototype Sabatier CO2 Reduction Subsystem was successfully designed, fabricated and tested. The lightweight, quick starting reactor utilizes a highly active and physically durable methanation catalyst composed of ruthenium on alumina. The use of this improved catalyst permits a single straight through plug flow design with an average lean component H2/CO2 conversion efficiency of over 99% over a range of H2/CO2 molar ratios of 1.8 to 5 while operating with flows equivalent to a crew size of one person steadystate to 3 persons cyclical (equivalent to 5 persons steady state). The reactor requires no heater operation after start-up even during simulated 55 minute lightside/39 minute darkside orbital operation over the above range of molar ratios and crew loadings. The subsystem's operation and performance is controlled by a microprocessor and displayed on a nineteen inch multi-colored cathode ray tube. Author

N81-14625# Seville Research Corp., Pensacola, Fla.
HUMAN FACTORS PROBLEMS IN GENERAL AVIATION Final Report, Jul. 1979 - Apr. 1980
J. B. Shelnutt, J. M. Childs, W. W. Prophet, and W. D. Spears Apr. 1980 116 p refs
(Contract DOT-FA79NA-6040)
(AD-A091670; SEVILLE-TR-78-01; FAA-CT-80-194) Avail: NTIS HC A06/MF A01 CSCL 01/2

Approximately 80% of general aviation accidents in the past decade have been attributed to errors made by pilots. For this reason, the most promising approach to making substantial improvements in general aviation safety is through the systematic study of factors affecting the performance of general aviation pilots (i.e., human factors) and use of the resultant information to enhance pilot performance. In recognition of the need for comprehensive information to aid in the planning of such studies, the major objective of the work reported here was to identify and analyze human factors design issues related to the major performance problems of general aviation pilots. Thirty five such issues were identified, primarily through the review of the human factors, aircraft accident, and general aviation literature. The analysis and discussion of these issues was structured through the use of a conceptual model of the components of the general aviation system. Six such components were identified--(1) aircraft, (2) airports, (3) aeronautical information systems, (4) the pilot certification and ratings, and (5) continuation training and recurrent proficiency assessments. GRA

N81-14146*# Spar Aerospace Products Ltd., Toronto (Ontario). RMS Div.
SHUTTLE REMOTE MANIPULATOR SYSTEM HARDWARE TEST FACILITY
C. G. Wagner-Bartak, J. A. Middleton, and J. A. Hunter (National Research Council of Canada, Ottawa) *In* NASA. Johnson Space Center The 11th Space Simulation Conf. 1980 p 79-94 refs (For primary document see N81-14138 05-31)
Avail: NTIS HC A19/MF A01 CSCL 05H

N81-14147*# Spar Aerospace Products Ltd., Toronto (Ontario).
THE ROLE OF THE REAL-TIME SIMULATION FACILITY, SIMFAC, IN THE DESIGN, DEVELOPMENT AND PERFORMANCE VERIFICATION OF THE SHUTTLE REMOTE MANIPULATOR SYSTEM (SRMS) WITH MAN-IN-THE-LOOP
J. R. McCllough, A. Sharpe, and K. H. Doetsch (National Research Council of Canada, Ottawa) *In* NASA. Johnson Space Center *The 11th Space Simulation Conf.* 1980 p 94-112 refs (For primary document see N81-14138 05-31)
Avail: NTIS HC A19/MF A01 CSCL 05H

55 PLANETARY BIOLOGY

Includes exobiology and extraterrestrial life.

No abstracts in this category.

59 MATHEMATICAL AND COMPUTER SCIENCES (GENERAL)

No abstracts in this category.

60 COMPUTER OPERATIONS AND HARDWARE

Includes computer graphics and data processing.
For components see *33 Electronics and Electrical Engineering.*

N81-14626# Stichting Mathematisch Centrum, Amsterdam (Netherlands). Dept. of Computer Science.
BITONIC SORT ON ULTRACOMPUTERS
L. G. L. T. Meertens Sep. 1979 10 p refs Submitted for publication
(MC-IW-117/79) Avail: NTIS HC A02/MF A01; Stichting Math. Centrum, Amsterdam FL 3

Ultracomputers are assemblages of processors that are able to operate concurrently and can exchange data through communication lines in, say, one cycle of operation. Batcher's bitonic sort is a sorting network, capable of sorting n inputs in theta ((log n) squared) stages. When adapted to conventional computers, it gives rise to an algorithm that runs in time theta (n(log n) squared). The resulting algorithm will take time theta ((log n) squared) for ultracomputers of 'size' N. The implicit constant factor is low, so that even for moderate values of N the ultracomputer architecture performs faster than the theta (N log N) time conventional architecture can achieve. Author

N81-14627# Stichting Mathematisch Centrum, Amsterdam (Netherlands). Dept. of Computer Science.
RECURRENT ULTRACOMPUTERS ARE NOT LOG N-FAST
L. G. L. T. Meertens Sep. 1979 11 p ref Submitted for publication
(MC-IW-118/79) Avail: NTIS HC A02/MF A01; Stichting Math. Centrum, Amsterdam FL 3

Ultracomputers are assemblages of processors that are able to operate concurrently and can exchange data through communication lines in, say, one cycle of operation. For physical reasons, the fan in/out of the processors must be limited. This imposes restrictions on the possible communication schemes. In order to have the ultracomputer operate efficiently as a whole, it is desirable that arbitrary exchanges of information between the processors can be effected in a small number of data shifts. Author

N81-14628# Stichting Mathematisch Centrum, Amsterdam (Netherlands). Dept. of Computer Sciences.
ABSTRACTO 84: THE NEXT GENERATION
L. G. L. T. Meertens Sep. 1979 24 p refs Submitted for publication
(MC-IW-120/79) Avail: NTIS HC A02/MF A01; Stichting Math. Centrum, Amsterdam FL 3

Programming languages are not an ideal vehicle for expressing algorithms. How a language Abstracto might be developed for 'algorithmic expressions' that may be manipulated by the rules of 'algorithms', quite similar to the manipulation of mathematical expressions in mathematics is sketched. Two examples are given of 'abstract' algorithmic expressions that are not executable in the ordinary sense, but may be used in the derivation of programs. It appears that the notion of 'refinement' may be replaced by a weaker notion for abstract algorithmic expresstions, corresponding also to a weaker notion of 'weakest precondition'. Author

N81-14629# Stichting Mathematisch Centrum, Amsterdam (Netherlands). Dept. of Computer Science.

THE REVISED ALGOL 68 TEST SET
Dick Grune, ed. Nov. 1979 255 p refs
(MC-IW-122/79) Avail: NTIS HC A12/MF A01; Stichting Math. Centrum, Amsterdam FL 17

The Revised MC ALGOL 68 Test (Version 3.0) Set is comprised of 190 ALGOL 68 programs covering the full language with the exception of bulk I/O. Most programs have been run on at least two ALGOL 68 systems. Author

N81-14630# Stichting Mathematisch Centrum, Amsterdam (Netherlands). Dept. of Computer Science.
HOW INEFFICIENT ARE STACK-ORIENTED ABSTRACT MACHINES?
Paul Klint Nov. 1979 10 p refs Submitted for publication
(MC-IW-123/79) Avail: NTIS HC A02/MF A01; Stichting Math. Centrum, Amsterdam FL 3

A comparison is made between the efficiencies of stack-oriented instruction sets and storage-to-storage instruction sets. It is shown that storage-to-storage instruction sets are more efficient. The implications of this observation are explored. R.C.T.

N81-14631# Stichting Mathematisch Centrum, Amsterdam (Netherlands). Dept. of Computer Science.
A COMPARITIVE ANALYSIS OF THE INTEL 8086, THE ZILOG Z8000 AND THE MOTOROLA MC68000 MICRO-PROCESSORS
Jan Heering Jan. 1980 21 p refs Submitted for publication
(MC-IW-129/80) Avail: NTIS HC A02/MF A01; Stichting Math. Centrum, Amsterdam FL 3

The architectures of three of the latest 16 bit microprocessors, the Intel 8086, the Zilog Z8000 and the Motorola MC68000, are discussed. Author

N81-14632# Istituto Superiore di Sanita, Rome (Italy). Lab. delle Radiazioni.
A PARALLEL PROCESSING OPERATING SYSTEM FOR THE MULTIPROCESSOR SEM
M. C. Azzolini 9 Jul. 1979 48 p refs In ITALIAN; ENGLISH summary
(ISS-T-79/11; ISSN-0390-6485) Avail: NTIS HC A03/MF 01

The operating system structure realized to allow the parallel processing of a single program, stored in a common memory, by means of two or more central processing units is detailed. In particular, the individual operating system routines and the architecture that the user's program must assume for the parallel processing are described. M.G.

N81-14633# Siemens A.G., Munich (West Germany). Werk fuer Integrierte Schaltungen.
BIPOLAR MICROPROCESSOR CIRCUITS Final Report
Gerhard Weil Bonn Bundesministerium fuer Forschung und Technologie Nov. 1979 82 p Partly in GERMAN and ENGLISH Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-79; ISSN-0340-7608) Avail: NTIS HC A05/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 16,80

The development of bipolar microprocessor devices and the cross software (ASSEMBLER, SIMULATOR) for a bipolar microprocessor system is addressed. Two MSI peripheral devices and three bipolar microprocessor LSI devices (RALU, SEQUENCER, INTERRUPT UNIT) are discussed. The essential process steps for a LSTTL-technology suitable for the manufacturing of bipolar LSI-circuits are described. M.G.

N81-14634# AEG-Telefunken, Ulm (West Germany). Forschungsinst.
A 32 KBIT CCD-MEMORY-DEVICE Final Report
Hans-Juergen Wulf Bonn Bundesministerium fuer Forschung und Technologie Dec. 1979 75 p refs In GERMAN; ENGLISH summary Sponsored by Bundeministerium fuer Forschung und Technologie
(BMFT-FB-T-79-105; ISSN-0340-7608) Avail: NTIS HC A04/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 15,55

Starting from general considerations for the design of digital charge coupled device memory chips a circuit is described, which shows a well designed chip organisation and incorporates clock generation. By using a two phase clocking system and a two layer polysilicon technology a storage cell was developed corresponding to the state of the art in photolithography and etching techniques for high yield mass production. The length of storage and transfer electrodes was fixed at 9 microns and 5 microns respectively. At a channel width of 6 microns the corresponding cell area is 392 sq microns and the chip area takes 27 sq mm. M.G.

N81-14635# Oakland Univ., Rochester, Mich. School of Engineering.
DESIGN OF FAULT-TOLERANT COMPUTERS USING ROM AS BASIC BUILDING BLOCK Interim Report, 1 Jul. 1979 - 30 Jun. 1980
D. K. Pradhan 7 Sep. 1980 12 p refs
(Contract F49620-79-C-0119; AF Proj. 2304)
(AD-A091715; AFOSR-80-1017TR) Avail: NTIS HC A02/MF A01 CSCL 09/2

A new class of codes particularly effective against unidirectional errors has been developed. These are systematic codes which correct symmetric errors as well as detect all unidirectional errors. Hence, these codes have a potential use in the design of fault tolerant computers. A technique to decompose ROM based logic is developed here. This technique is formulated by using Galois switching theory. GRA

N81-14636# Naval Research Lab., Washington, D. C. Acoustics Div.
ROLE OF THE SECTIONALIZED FOURIER TRANSFORM IN HIGH-SPEED COHERENCE PROCESSING Interim Report
Albert A. Gerlach 16 Oct. 1980 35 p refs
(ARPA Order 3074)
(AD-A091419; NRL-8438) Avail: NTIS HC A03/MF A01 CSCL 09/2

The sectionalized Fourier Transform, a bandlimited signal, (defined as a Fourier Transform which is computed over incremented temporal sections of the function) is equivalent to basebanding, filtering, and sampling the signal in the time domain. Spectral windowing is employed, through appropriately summing a sequence of the Fourier Transform bins, to control the passband and leakage characteristics of the resulting filter. This in turn controls the distortion of the signal induced as a result of the transform process. The use of the sectionalized Fourier Transform is exploited to conveniently and rapidly map the cross correlation envelope of narrowband signals over the time register Doppler-ratio (ambiguity) plane. By using the ambiguity kernel expli 2 pi alpha ft) as an approximation of signal time compression (or expansion), the coherence between transformed signals (along the Doppler-ratio axis) may further be expedited through use of the discrete Fourier Transform. The resulting error is negligible when the time bandwidth product of the process is less than the inverse of the maximum Doppler ratio employed. The resulting algorithms have proved advantageous in underwater acoustic applications. It is concluded that the sectionalized Fourier Transform has many applications in time domain signal processing using modern array digital computers. GRA

N81-14637# *Air Force Academy, Colo. Dept. of Electrical* Engineering.
THE USAFA/8086. A STATE OF THE ART MICROPROCESSOR SYSTEM. VOLUME 1: SYSTEM HARDWARE Final Report
Joseph J. Pollard Jun. 1980 169 p refs 2 Vol.
(AD-A091772; USAFA-TR-80-16-Vol-1) Avail: NTIS HC A08/MF A01 CSCL 09/2

This final technical engineering report details the research and development of a modern sixteen bit microprocessor based computer system. The system utilizes state-of-the-art devices to implement many functions often found only in mini-computers and other larger systems. The research detailed in this report *was performed under the joint sponsorship of the Air Force* Flight Dynamics Laboratory (WPAFB, OH) and the Frank J. Seilier Research Laboratory (USAFA, CO) from August 1978 to March *1980.* *GRA*

N81-14638# Air Force Academy, Colo. Dept. of Electrical Engineering.

THE USAFA/8086. A STATE OF THE ART MICROPROCESSOR SYSTEM. VOLUME 2: SOFTWARE DOCUMENTATION *Final Report,*
Joseph J. Pollard Jun. 1980 176 p 2 Vol.
(AD-A091779; USAFA-TR-80-16-Vol-2) Avail: NTIS *HC A09/MF A01 CSCL 09/2*

This report details the software developed at the U.S. Air Force Academy *to support development of the USAFA/8086* microprocessor system. There are three primary modules consisting of the non-disk operating system (USAF86), the disk operating *system (DOS86), and the disk interface software (DISK86). The* first two modules are written in PLM86 while DISK86 is written in ASM86. An operator's manual is included as an appendix. GRA

N81-14639# Sandia Labs., Albuquerque, N. Mex. Data Planning Div.
A TWO-STAGE NONRECURSIVE FILTER/DECIMATOR
James R. Yoder and Billy D. Richard Aug. 1980 24 p refs Sponsored by DOE
(SAND-80-0891) Avail: NTIS HC A02/MF A01

A two-stage digital filter/decimator was designed and implemented to reduce the sampling rate associated with the long-term computer storage of certain digital waveforms. The design selection and implementation process are described. A filter design with finite impulse response (nonrecursive) was chosen for implementation via direct convolution. A newly-developed system-test statistic validates the system under different computer-operating environments. Author

N81-14640# Sandia Labs., Albuquerque, N. Mex. Electronic and Transport Phenomena in Solids Div.
A VERSATILE MICROCOMPUTER-BASED TEMPERATURE CONTROLLER
Victor R. Yarberry Sep. 1980 51 p refs Sponsored by DOE
(SAND-79-2313) Avail: NTIS HC A04/MF A01

The wide range of thermal responses required in laboratory and scientific equipment requires a temperature controller with great flexibility. While a number of analog temperature controllers are commercially available, they have limitations, such as inflexible parameter control or insufficient precision. Most lack digital interface capabilities--a necessity when the temperature controller is part of a computer-controlled automatic data acquisition system. An extremely versatile microcomputer-based temperature controller was developed to fulfill this need in a variety of equipment. The control algorithm used allows optimal tailoring of parameters to control overshoot, response time, and accuracy. This microcomputer-based temperature controller can be used as a stand-alone instrument (with a teletype used to enter parameters), or it can be integrated into a data acquisition system. Author

N81-14641# Edgerton, Germeshausen and Grier, Inc., Idaho Falls, Idaho. Measurement and Control Systems Div.
APPLICATION OF MICROPROCESSORS IN MEASUREMENT
M. Ray Johnson 1980 11 p refs Presented at Intern. Symp. on Appl. of Microprocessors in Devices for Instrumentation and Automatic Controls, London, 17 Nov. 1980
(Contract DE-AC07-76ID-01570)
(CONF-801116-1) Avail: NTIS HC A02/MF A01

IC technology is surveyed, particularly microprocessors, microcomputers, and related devices. With design efforts becoming so software-intensive the question of computer languages and language level is also addressed. To add perspective, the major microprocessor application areas of energy systems, automobiles, and man/machine interfacing are surveyed with emphasis on measurement rather than control. These are representative of the growing usefulness of inexpensive computer intelligence. In addition, two measurement system microprocessor-based design efforts underway at the Idaho National Engineering Laboratory are described. DOE

N81-14642# Network Analysis Corp., Vienna, Va.
DISTRIBUTED DATA PROCESSING STANDARDS FORECAST Final Report
Thomas R. Stack and Kathleen A. Dillencourt 9 Jul. 1980 287 p refs
(Contract NB79-SBCA-0320)
(PB80-216211) Avail: NTIS HC A13/MF A01 *CSCL 09B*

Distributed Data Processing (DDP) technology is reviewed in each of five different areas: methodologies, protocols, distributed *operating systems, and DDP software development tools. Many* DDP technical issues are identified and a prioritized list of standards activities recommendations and the cost avoidance *for the years 1983-1986 that these standards activities could* potentially achieve is given. A total of 52 standards activities are presented. Five types of standards activities are defined and characterized according to the product type that results: (1) standards, (2) guidelines, (3) analysis reports, (4) reports, and (5) standard validation procedures. GRA

N81-14643# National Bureau of Standards, Washington, D.C. Inst. for Computer Science and Technology.
PROSPECTUS FOR DATA DICTIONARY SYSTEM STANDARD
Sep. 1980 20 p refs
(PB80-225204; NBSIR-80-2115) Avail: NTIS HC A02/MF A01 CSCL 09B

A data dictionary system is an automated information system to assist in organization-wide data management, without restriction to computer data. Efforts to develop a Federal data dictionary system standard is described. The scope and purpose of the standard, the intended audience, general issues being investigated and the basic project approach are included. GRA

N81-14644# National Bureau of Standards, Washington, D.C. Inst. for Computer Sciences and Technology.
COMPUTER SCIENCE AND TECHNOLOGY: CONVERSION Final Report
Joseph C. Collica, Mark W. Skall, and Gloria R. Bolotsky Aug. 1980 77 p refs
(PB80-215338; NBS-SP-500-62; LC-80-600106) Avail: NTIS HC A05/MF A01 CSCL 09B

Three sources were used for gathering the required information to prepare this tutorial: (1) interviews with commercial conversion experts; (2) interviews with Federal Government agency personnel who have recently experienced conversions; and (3) current literature. GRA

N81-14645# National Technical Information Service, Springfield, Va.
TRENDS IN COMPUTER TECHNOLOGY. CITATIONS FROM THE NTIS DATA BASE Progress Report, 1964 - Aug. 1980
Jack E. Jones Aug. 1980 143 p Supersedes NTIS/PS-79/1007; NTIS/PS-78/0937
(PB80-815129) Avail: NTIS HC $30.00/MF $30.00 CSCL 09B

Past, present, and future trends in computer hardware development and computer software generation are cited. The bibliography contains 138 abstracts. GRA

61 COMPUTER PROGRAMMING AND SOFTWARE

Includes computer programs, routines, and algorithms.

N81-14646*# Computer Sciences Corp., Hampton, Va.
A COMPUTER PROGRAM FOR THE GENERATION OF LOGIC NETWORKS FROM TASK CHART DATA Final Report
Henry E. Herbert Washington NASA Dec. 1980 38 p refs
(Contract NAS1-16078)
(NASA-CR-3364) Avail: NTIS HC A03/MF A01 CSCL 09B

The Network Generation Program (NETGEN), which creates logic networks from task chart data is presented. NETGEN is written in CDC FORTRAN IV (Extended) and runs in a batch mode on the CDC 6000 and CYBER 170 series computers. Data is input via a two-card format and contains information regarding the specific tasks in a project. From this data, NETGEN constructs a logic network of related activities with each activity having unique predecessor and successor nodes, activity duration,

descriptions, etc. NETGEN then prepares this data on two files *that can be used in the Project Planning Analysis and Reporting* System Batch Network Scheduling program and the EZPERT *graphics program.* M.G.

N81-14647# Texas A&M Univ., College Station. Dept. of *Aerospace Engineering.*

MODIFICATIONS TO THE HESS THREE-DIMENSIONAL LIFTING BODY CODE TO CONVERT FROM CDC FORTRAN TO IBM FORTRAN WITH REDUCTIONS IN CORE REQUIREMENTS AND EXECUTION TIMES

S. J. Miley [1981] 19 p *refs*
Avail: NTIS HC A02/MF A01

A version of the Hesscode available through NASA includes an additional geometry package coded in CDC FORTRAN. In order to run this NASA program on an AMDAHL computer using IBM FORTRAN H, the CDC FORTRAN logic was converted to IBM FORTRAN logic, and the memory requirements were compressed. The modified version, using the FORTRAN H optimization level 2 compiler requires only 268K bytes of memory. Four elements involved in the modification to the CDC logic include: (1) use of a positive-indefinite variable for input array test purposes; (2) the use of the LOFC function throughout the code; (3) conversion from CDC specialized mass storage I/O to IBM random access I/O; and (4) a coding change in subroutine VFMNLF and VFMLFT. The core modification is one of replacing all large memory blocks by a single labeled common block dimensioned 42,900. A.R.H.

N81-14648*# Lockheed Engineering and Management Services Co., Inc., Houston, Tex.

FLOPPY DISK UTILITY USER'S GUIDE

J. W. Akers Jul. 1980 23 p
(Contract NAS9-15800)
(NASA-CR-160889; JSC-16770; LEMSCO-15182) Avail: NTIS HC A02/MF A01 CSCL 09B

A floppy disk utility program is described which transfers programs between files on a hard disk and floppy disk. It also copies the data on one floppy disk onto another floppy disk and compares the data. The program operates on the Data General NOVA-4X under the Real Time Disk Operating System. Sample operations are given. M.G.

N81-14649# Stichting Mathematisch Centrum, Amsterdam (Netherlands). Dept. of Computer Science.

A CHARACTERIZATION OF COMPUTABLE DATA TYPES BY MEANS OF A FINITE, EQUATIONAL SPECIFICATION METHOD

J. A. Bergstra (Leiden Univ.) and J. V. Tucker Nov. 1979 26 p refs Submitted for publication
(MC-IW-124/79) Avail: NTIS HC A03/MF A01; Stichting Math. Centrum, Amsterdam FL 3

A characterization is given of the data types and data structures whose semantics are constructive in terms of the structural properties of algebraically styled proof systems available for their definition. It is proved that the computable data types are precisely those which may be defined by deductive systems, equationally specified in a finite way, and which satisfy two simple conditions on the deductions which may take place within them. M.G.

N81-14650# Stichting Mathematisch Centrum, Amsterdam (Netherlands). Dept. of Computer Science.

EXCEPTION HANDLING WITH MULTIEXIT STATEMENTS

R. J. R. Back Nov. 1979 14 p refs Submitted for publication
(MC-IW-125/79) Avail: NTIS HC A02/MF A01; Stichting Math. Centrum, Amsterdam FL 3

A language construct, the multiexit statement, is proposed. This provides a clean way of handling exceptional situations in programs, and makes the programs easy to prove correct. Proof rules for showing the total correctness of multiexit statements are given which provide an axiomatisation of goto-statements. This axiomatisation is based on the symbolic execution technique. It conforms closely to the intuition of the programmer making manual proofs of the program correctness easy to perform. R.C.T.

N81-14651# Stichting Mathematisch Centrum, Amsterdam *(Netherlands). Dept. of Computer Science.*

AN OVERVIEW OF THE SUMMER PROGRAMMING LANGUAGE

Paul Klint Dec. 1979 16 p refs Submitted for publication
(MC-IW-126/79) Avail: NTIS HC A02/MF A01; Stichting *Math. Centrum, Amsterdam FL 3*

The language SUMMER is intended for the solution of problems in text processing and string maniuplation. The language *consists of a small kernel which supports success directed* evaluation, control structures, recovery caches and a data abstraction mechanism. Extension of this kernal to support simultaneous pattern matching in arbitrary domains is demonstrated. Author

N81-14652# Stichting Mathematisch Centrum, Amsterdam (Netherlands). Dept. of Computer Science.

EQUATIONAL SPECIFICATIONS FOR COMPUTABLE DATA TYPES: SIX HIDDEN FUNCTIONS SUFFICE AND OTHER SUFFICIENCY BOUNDS

J. A. Bergstra (Leiden Univ.) and J. V. Tucker Jan. 1980 20 p refs Submitted for publication
(MC-IW-128/80) Avail: NTIS HC A02/MF A01; Stichting Math. Centrum, Amsterdam FL 3

The algebraic theory of data types identifies, semantically, each data type with a many sorted algebra. If A is a computable, infinite but finitely generated, many sorted algebra with n sorts then A possesses a finite equational specification which involves at most n hidden constants and at most $3n+3$ hidden functions. Thus in case A is single sorted we have the bound of 6. Simple bounds on the number of equations used in the specifications are also included. S.F.

N81-14653# Stichting Mathematisch Centrum, Amsterdam (Netherlands). Dept. of Computer Science.

COMPUTING IN ALGEBRAIC SYSTEMS

J. V. Tucker Jan. 1980 24 p refs Submitted for publication
(MC-IW-130/80) Avail: NTIS HC A02/MF A01; Stichting Math. Centrum, Amsterdam FL 3

The basic recursion theory of functions computable by different kinds of register machines designed to operate within an arbitrarily chosen algebraic system is described. Special emphasis is placed upon computation in natural algebraic systems such as groups, rings and fields. A theorem about the topological structure of computable subsets of a Hausdorff topological algebra is proved. Author

N81-14654# National Physical Lab., Teddington (England). Computing Services Unit.

A PASCAL PROCESSOR VALIDATION SUITE

B. A. Wichmann and A. H. J. Sale (Tasmania Univ.) Mar. 1980 30 p refs
(NPL-CSU-7/80; ISSN-0143-733-X) Avail: NTIS HC A03/MF A01

A suite of test programs designed to support the draft standard for the programming language PASCAL is described. The suite of programs is called a validation suite for PASCAL processors; however, no amount of testing assures that a processor that passes all tests is error free. Inherent in each test are assumptions about possible processors and their designs; a processor which violates an assumption may apparently pass the test without doing so in reality. Also, some violations may simply not be tested because they never occurred to the validation suite designers, nor were generated from the draft Standard. Implementors of PASCAL may use the test series to assist them in producting an error free processor. The large number of tests, and their independent origin, will assist in detecting many probable implementation errors. The series may also be of use for re-validating a processor after incorporating a new feature, or correcting an error. S.F.

N81-14655# National Physical Lab., Teddington (England). Div. of Numerical Analysis and Computer Science.

EVALUATION OF THE LANGUAGE ADA FOR USE IN NUMERICAL COMPUTATIONS

M. G. Cox and S. J. Hammarling Jul. 1980 43 p refs
(NPL-DNACS-30/80; ISSN-0143-7348) Avail: NTIS HC A03/MF A01

The suitability of the high level computer programming language Ada for numerical computations in the context of an algorithms library was assessed. A suite of interrelated algorithms for the least squares solution of systems of linear algebraic equations was chosen as the basis of the assessment. Issues arising from this analysis which suggest possible language clarification and change are detailed. R.C.T.

N81-14656# Royal Inst. of Tech., Stockholm (Sweden). Dept. of Numerical Analysis and Computing Science.
STUDIES OF SOME ALGORITHMS FOR DIGITAL PICTURE PROCESSING
Jan-Olof Eklundh 1980 12 p refs
(TRITA-NA-8003) Avail: NTIS HC A02/MF A01

Some algorithms in digital picture processing, characterized by the fact that they work on local windows of the data are discussed. The problem of transposing large matrices with limited high-speed storage, that occurs in connection with the computation of two dimensional integral transforms and convolutions, is addressed. Four such algorithms are presented and their complexity investigated. The use of probabilistic relaxation methods for pixel classification in multispectral pictures is then discussed. It is shown that the approach tends to give better results than some other commonly applied techniques. A local method for image smoothing without blurring and a method to construct structural descriptions of waveforms are also described. M.G.

N81-14657# Stichting Mathematisch Centrum, Amsterdam (Netherlands). Dept. of Computer Science.
A SURVEY OF HIGH LEVEL MICROPROGRAMMING LANGUAGES
Marlene Sint Jun. 1980 27 p refs Submitted for publication
(MC-IW-138/80) Avail: NTIS HC A03/MF A01; Stichting Math. Centrum, Amsterdam FL 3

The current state of design and implementation of high level microprogramming languages is surveyed. First, a number of important design issues is formulated. Next, four microprogramming languages are considered in detail, to see how each of them approached these issues. Brief remarks are made about six other languages. Finally, some concluding remarks are made. Author

N81-14658# Stichting Mathematisch Centrum, Amsterdam (Netherlands). Dept. of Computer Science.
TIME AND SPACE COMPLEXITY OF INSIDE-OUT MACRO LANGUAGES
Peter R. J. Asveld Jul. 1980 16 p refs Submitted for publication
(MC-IW-141/80) Avail: NTIS HC A02/MF A01; Stichting Math. Centrum, Amsterdam FL 3

Starting from the IO Standard Form Theorem it is shown that for each inside-out (or IO-) macro language L there exists a lambda-free IO-macro grammar with the following property: for each x in L there is a derivation of x of length at most linear in the length of x. A nondeterministic log space bounded auxiliary pushdown automation is then constructed which accepts L in polynomial time. Therefore the IO-macro languages are (many-one) log-space reducible to the context free languages. Consequently, the membership problem for IO-macro languages can be solved deterministically in polynomial time and in space (log n)(2). M.G.

N81-14659# Rochester Univ., N. Y. Dept. of Statistics.
BIPLOT DISPLAY MULTIVARIATE MATRICES FOR INSPECTION OF DATA AND DIAGNOSIS
K. Ruben Gabriel Sep. 1980 51 p refs Presented at the Looking at Multivariate Data Symp., Sheffield, Engl., Mar. 1980
(Contract N00014-80-C-0387)
(AD-A091821; TR-801) Avail: NTIS HC A04/MF A01 CSCL 09/2

The biplot graphical display is introduced and its mathematical properties indicated. Its use for inspecting data matrices is illustrated for small and large matrices as well as for variance-covariance configurations and multivariate means of several samples. Its usefulness in diagnosing models is explained and illustrated by several examples requiring increasingly complex linear and harmonic models. Some comments are made on the relation to other multivariate displays. GRA

N81-14660# Softech, Inc., Waltham, Mass.
ADA COMPILER VALIDATION IMPLEMENTERS' GUIDE
John B. Goodenough, John R. Kelly, N. Lomuto, Robert Mandl, and Brian A. Wichmann 1 Oct. 1980 309 p refs Prepared in cooperation with National Physical Lab., London, Engl.
(Contract MDA903-79-C-0687)
(AD-A091760; Rept-1067-2.3) Avail: NTIS HC A14/MF A01 CSCL 09/2

This report is one of the documents being produced as part of the Ada Compiler Validation Capability (ACVC). The primary purpose of the ACVC is to help in deciding whether Ada translators conform to be the Ada language standard. A secondary purpose is to help Ada implementers comply with the Ada standards. GRA

N81-14661# Goodyear Aerospace Corp., Akron, Ohio.
CONTOUR DIGITIZING AND TAGGING SOFTWARE (CONTAGRID) Final Report, Sep. 1977 - Dec. 1979
N. J. Adams, M. Anderson, G. A. Biecker, R. Messner, J. King, and J. Vocar Apr. 1980 170 p
(Contract DAAK70-77-C-0223)
(AD-A091736; GER-16752; ETL-0228) Avail: NTIS HC A08/MF A01 CSCL 09/2

The Contour Digitizing and Tagging Software (CONTAGRID) program demonstrates that a parallel/sequential processor combination can effectively perform automated elevation tagging and elevation gridding operations. It demonstrates that such a processor set is capable of automating the entire Digital Terrain Elevation Data generation task from processing the rasterized input map sheet overlay data to outputting the final digital product. GRA

N81-14662# City Coll. of the City Univ. of New York. Dept. of Computer Science.
STEEPEST EDGE ALGORITHMS IN LINEAR AND NONLINEAR PROGRAMMING Final Report, 1 Jun. 1977 - 31 Jul. 1980
Donald Goldfarb Sep. 1980 8 p refs
(Grant DAAG29-77-G-0114)
(AD-A091608; Rept-80-1; ARO-14180.3-M) Avail: NTIS HC A02/MF A01 CSCL 12/1

Several algorithms in linear and nonlinear programming have been developed and analyzed. A worst case analysis of the steepest edge simplex method showed it to have exponential time complexity. This algorithm was specialized for solving minimum cost network flow problems and a partial pricing variant was developed. After extensive testing on randomly generated large problems the method was found to be inferior to efficiently coded partial pricing variants of the 'standards' simplex method except for the max flow problem and the problem of finding a feasible flow. On the max flow problem the algorithm was compared with the Edmonds-Karp and Dinic algorithms and found to be superior. In quadratic programming, the use of the steepest edge (face) criterion for dropping constraints was found to be helpful. Dual methods were found to be even more efficient and their use in recursive quadratic programming algorithms for nonlinear programming problems is recommended. A numerically stable ellipsoid algorithm for linear programming was developed and analyzed. At present the main promise that this method holds is as a powerful theoretical tool. Several minimization algorithms for taking advantage of negative curvature were developed as was a curvilinear steplength algorithm which ensures convergence to a positive semidefinite point. GRA

N81-14663# Army Engineer Topographic Labs., Fort Belvoir, Va.
ANTIFACT REMOVAL IN FREQUENCY DOMAIN COMPRESSED IMAGERY Research Note, 1 Apr. 1978 - 1 Apr. 1979
Robert S. Pazak Jul. 1980 32 p refs
(DA Proj. 1K4-63730-D-560)
(AD-A091533; ETL-0233) Avail: NTIS HC A03/MF A01 CSCL 09/2

Two types of images were compressed in the frequency domain and expanded back to the spatial domain. A technique

was investigated that retransforms the images into the frequency domain, where artifacts generated during the original compression phase are removed and the images are again converted to the spatial domain. GRA

N81-14664# Maryland Univ., College Park. Computer Vision Lab.

A UNILATERAL REPRESENTATION FOR AUTO-REGRESSIVE RANDOM FIELD MODELS Interim Report

P. R. Thrift Sep. 1980 9 p refs

(Grant AF-AFOSR-3271-77)

(AD-A091644; TR-948; AFOSR-80-1153TR) Avail: NTIS HC A02/MF A01 CSCL 09/2

This paper discusses autoregressive random field (ARF) models and derives a unilateral representation driven by uncorrelated noise. GRA

N81-14665# Stanford Univ., Calif. Dept. of Computer Science.

PROBLEMATIC FEATURES OF PROGRAMMING LANGUAGES: A SITUATIONAL-CALCULUS APPROACH. PART 1: ASSIGNMENT STATEMENTS

Zohar Manna and Richard Waldinger (SRI International Corp.) Sep. 1980 84 p refs

(Contracts N00014-76-C-0687; N00014-75-C-0816; F30602-78-C-0099; Grants NSF MCS-78-02591; NSF MCS-79-09495)

(AD-A091639; SU-STAN-CS-80-779) Avail: NTIS HC A05/MF A01 CSCL 09/2

Certain features of programming languages, such as data structure operations and procedure call mechanisms, have been found to resist formalization by classical techniques. An alternate approach is presented, based on a 'situational calculus,' which makes explicit reference to the states of a computation. For each state, a distinction is drawn between an expression, its value, and the location of the value. Within this conceptual framework, the features of a programming language can be described axiomatically. Programs in the language can then be synthesized, executed, verified, or transformed by performing deductions in this axiomatic system. Properties of entire classes of programs, and of programming languages, can also be expressed and proved in this way. The approach is amenable to machine implementation. In a situational calculus formalism it is possible to model precisely many 'problematic' features of programming languages, including operations on such data structures as arrays, pointers, lists, and records, and such procedure call mechanisms as call-by-reference, call-by-value, and call-by-name. No particular obstacle is presented by aliasing between variables, by declarations, or by recursive procedures. The paper is divided into three parts, focusing respectively on the assignment statement, on data structure operations, and on procedure call mechanisms. GRA

N81-14666# TRW Defense and Space Systems Group, Redondo Beach, Calif.

FORMAL SEMANOL SPECIFICATION OF ADA Final Technical Report, Jul. 1979 - Jun. 1980

Paul T. Berning Griffiss AFB, N.Y. RADC Sep. 1980 65 p

(Contract F30602-79-C-0204)

(AD-A091682; RADC-TR-80-293) Avail: NTIS HC A04/MF A01 CSCL 09/2

This report summarizes the performance and results of a contractual effort to develop a formal operational specification of the DoD common programming language Ada. The formalism used was that of the Semantics Oriented Language, SEMANOL. The design produced essentially covers the entire Ada language, ignoring only the low-level semantics of implementation dependencies. The SEMANOL system and its use in the specification of Ada language features of a type not previously addressed in SEMANOL specifications of other languages is provided. The report is concluded with a list of problems discovered, in the design of the Ada language, as a result of the formal specification. GRA

N81-14667# Army Concepts Analysis Agency, Bethesda, Md. Methodology and Computer Support Directorate.

PROGTEST: A COMPUTER SYSTEM FOR THE ANALYSIS OF COMPUTATIONAL COMPUTER PROGRAMS

Steve Bravy Apr. 1980 125 p

(AD-A091653; CAA-D-80-1) Avail: NTIS HC A07/MF A01 CSCL 09/2

This system assists the testing and debugging of computational computer programs by generating test points for the tested program at each test point. This information may be used to infer the operation of, or to predict output values of an operational program as well. The performance data highlighting input variable sensitivities is analyzed further by one of the components of the system. This writeup contains complete documentation of the system, including description of the methodology, sample outputs, flowcharts and listings. The package is written in UNIVAC's FORTRAN V. GRA

N81-14668# Desmatics, Inc., State College, Pa.

AN EXAMINATION OF THE PERFORMANCE OF TWO-STAGE GROUP SCREENING FOR USE IN COMPUTER SIMULATION

Carl A. Mauro and Dennis E. Smith Oct. 1980 57 p refs

(Contract N00014-79-C-0650; NR Proj. 274-317)

(AD-A091553; TR-113-3) Avail: NTIS HC A04/MF A01 CSCL 09/2

When only a limited number of simulation runs are available, it is usually impossible to thoroughly investigate all of the factors under consideration. Often, though, it is anticipated that only a small subset of the original factors is important. Accordingly, it is desired to screen the factors in order to help identify those that do exert an appreciable effect on the simulation response. Two-stage group screening is one possible strategy that may be used. However, a basic assumption of this strategy is that the directions of possible effects are known, a priori. This report examines, in the case of zero error variance (i.e., when the simulation response is observed without random error), the performance of two-stage group screening when the assumption of known directions is relaxed. GRA

N81-14669# General Electric Co., Arlington, Va. Information Systems Programs.

THE EFFECTS OF SYMBOLOGY AND SPATIAL ARRANGEMENT ON THE COMPREHENSION OF SOFTWARE SPECIFICATIONS

Sylvia B. Sheppard, Elizabeth Kruesi, and Bill Curtis 1 Oct. 1980 79 p refs

(Contract N00014-79-C-0595; NR Proj. 196-160)

(AD-A091614; TR-80-388200-2) Avail: NTIS HC A05/MF A01 CSCL 09/2

Seventy-two participants were presented with specifications for each of three modular-sized computer programs. Nine different specification formats were prepared for each program. These formats varied along two dimensions: type of symbology and spatial arrangement. The type of symbology included natural language, constrained language (PDL), and ideograms (flowchart symbols). The spatial arrangement included sequential (vertical flow), branching (flowchart), and hierarchical (tree-like). The participants answered a series of comprehension questions on each program presented interactively on a CRT using only the program specifications. Three types of questions were presented. These included the forward-tracing of conditions to determine the next process to be executed, backward-tracing to determine the conditions which must be satisfied for a process to be executed, and tracing of variable values (input-output). Both forward- and backward-tracing questions were answered more quickly from specifications presented in constrained language or ideograms than in natural language. Forward-tracing questions were answered most quickly from a branching arrangement, and backward-tracing questions were answered more quickly from branching and hierarchical arrangements. Response times to the input-output questions did not vary significantly as a function of the type of symbology or the spatial arrangement. These results extend previous research on presentation formats by demonstrating the separate contributions of symbology and spatial arrangement to comprehension. GRA

N81-14670# Oak Ridge National Lab., Tenn. Computer Sciences Div.

RSTS/E COMMUNICATIONS LINK VIA AN ASYNCHRONOUS MULTIPLEXER

D. L. Million Sep. 1980 47 p

(Contract W-7405-eng-26)
(ORNL/CSD/TM-128) Avail: NTIS HC A03/MF A01

The Biology Division of Oak Ridge National Laboratory had an immediate need for a communications link between two PDP-11 computers, to allow timesharing users to transfer disk files between systems, while waiting for software development on a more general communications system. A program was written to use one line of a DZ11 asynchronous mutlipler on each computer for communications, and thus make a simple hardware conncection with a RS232C null modem possible. A second program was written to permit easy user access to the link. Development, implementation, and performance of the programs are described. DOE

N81-14671# Department of Energy, Washington, D. C. Systems Software Branch.
S2KPLOT/DOEPLOT, IMPLEMENTATION AND PROGRAMMERS MANUAL
May 1980 95 p
(PB80-219926; DOE/DE-80/003A) Avail: NTIS HC A05/MF A01 CSCL 09B

S2KPLOT provides a direct link between any SYSTEM 2000 data base and a user-oriented plotting capability and may be used in a batch mode or interactively, under the time sharing option of IBM OS/MVS on IBM 370 or 303x computers. The plots created may be output immediately at a graphics terminal or saved in a disk file, to be retrieved later for either on-line or off-line processing. In addition to the plots, S2KPLOT optionally produces two reports, showing the data used in creating each plot. Plots produced may be line, bar, pie, or United States map, by state. Numerous other options select the types of axis, grid lines, tick marks, data processing and character styles. S2KPLOT utilizes the proprietary software packages SYSTEM 2000 and DISSPLA. In addition, support software for the various graphics devices used by S2KPLOT are supplied by the vendors of those devices. GRA

N81-14672# National Bureau of Standards, Washington, D.C. National Engineering Lab.
PROBLEMS USED IN TESTING THE EFFICIENCY AND ACCURACY OF THE MODIFIED GRAM-SCHMIDT LEAST SQUARES ALGORITHM Final Report
Roy H. Wampler Aug. 1980 86 p refs
(PB80-219777; NBS-TN-1126) Avail: NTIS HC A05/MF A01 CSCL 09B

The various types of problems used to explore the efficiency and accuracy of the modified Gram-Schmidt least squares algorithm are described. The Fortran subprograms which performed the various tests are listed in an appendix. Also listed are the data used in executing the testing routines as well as typical output from several types of problems. Among the testing routines is one which is suitable for handling general linear least squares problems. Here, the user has the option of scaling his raw data in order to indicate the effects of ill-conditioning. GRA

N81-14673# Federal Compiler Testing Center, Falls Church, Va.
CONVERSION PRODUCTS/AIDS SURVEY, AUGUST 1980 Final Report
Aug. 1980 150 p
(PB80-222029; GSA/FCSC-80/01) Avail: NTIS HC A07/MF A01 CSCL 09B

All data contained in this report were verified by the conversion product vendors in July 1980 to ensure accuracy. This survey is intended to be one of the primary sources of information on conversion products available to Federal agencies. It presents the survey results and contains vendor and product information, as well as a narrative summary of each product. GRA

N81-14674# Department of Energy, Washington, D. C. Office of Computer Services and Telecommunication Management.
S2KPLOT VERSION 3.0, USER'S MANUAL
May 1980 90 p
(PB80-219934; DOE/DF-80/003B) Avail: NTIS HC A05/MF A01 CSCL 09B

A plotting interface, S2KPLOT, is described which provides a direct link between any SYSTEM 2000 data base and a user oriented plotting capability. S2KPLOT may be used in a batch mode or interactively, under the Time Sharing Option of IBM OS/MVS on IBM 370 or 303x computers. The plots created may be output immediately at a graphics terminal or saved in a disk file, to be retrieved later for either on-line or off-line procession. In addition to the plots, S2KPLOT can optionally produce two reports, showing the data used in creating each plot. Plots produced may be line, bar, pie, or United States map, by state. Numerous other options select the types of axis, grid lines, tick marks, data processing, and character styles. GRA

N81-14675# Federal Compiler Testing Center, Washington, D.C. Automated Data and Telecommunications Service.
DATAPOINT 6600 COBOL 3.3 Validation Summary Report
21 Aug. 1980 45 p
(PB80-219868; CCVS74-VSR630) Avail: NTIS HC A03/MF A01 CSCL 09B

The Validation Summary Report for the Datapoint 6600 Cobol Compiler Version 3.3 provides a consolidated summary of the results obtained from the validation of the subject compiler against the 1974 Cobol Standard. The VSR is made up of several sections showing the discrepancies found. These include an overview of the validation which lists all categories of discrepancies by level/module, a section relating the categories of discrepancies to each of the federal levels of the language; and a detailed listing of discrepancies together with the tests which were failed. GRA

N81-14676# Federal Compiler Testing Center, Washington, D.C. Automated Data and Telecommunications Service.
SPERRY UNIVAC EXEC-8 OPERATING SYSTEM Validation Summary Report
21 Aug. 1980 71 p
(PB80-219876; CCVS74-VSR625) Avail: NTIS HC A04/MF A01 CSCL 09B

The Validation Summary Report for the Univac 1100 Series Cobol Compiler Version 5R1 provides a consolidated summary of the results obtained from the validation of the subject compiler against the 1974 Cobol Standard. The VSR is made up of several sections showing the discrepancies found. These include an overview of the validation which lists all categories of discrepancies by level/module, a section relating the categories of discrepancies to each of the federal levels of the language; and a detailed listing of discrepancies together with the tests which were failed. GRA

N81-14677# National Technical Information Service, Springfield, Va.
APPLICATIONS OF THE FAST FOURIER TRANSFORM. CITATIONS FROM THE NTIS DATA BASE Progress Report, Sep. 1977 - Aug. 1980
Brian Carrigan Sep. 1980 180 p Supersedes NTIS/PS-79/1019; and NTIS/PS-78/0932
(PB80-815491; NTIS/PS-79/1019; NTIS/PS-78/0932) Copyright. Avail: NTIS HC $30.00/MF $30.00 CSCL 09B

Research papers on the broad use of the Fast Fourier Transform (FFT) in signal processing are cited. Some of the applications include image processing, pattern recognition, parallel processing, voice communication, digital filtering, Kalman filtering, seismic detection, radar tracking, and spectrum analysis. Also included are brief comparisons of the FFT to some of the other transforms; i.e., Walsh, Laplace, and the discrete Fourier, that are used in processing signals. GRA

62 COMPUTER SYSTEMS

Includes computer networks.

N81-14678# Sandia Labs., Albuquerque, N. Mex. Computer Communications Design Div.
AN OVERVIEW OF A MINICOMPUTER NETWORK
Michael O. Vahle and Lawrence F. Tolendino Aug. 1980 29 p Sponsored by DOE
(SAND-80-0821) Avail: NTIS HC A03/MF A01

A computer network was developed to support minicomputers used at a number of locations within Sandia National

Laboratories. The control strategies, capabilities, and design philosophies of the minicomputer network are described. Author

N81-14679# National Technical Information Service, Springfield, Va.
COMPUTER NETWORKS. CITATIONS FROM THE NTIS DATA BASE Progress Report, Aug. 1979 - Jul. 1980
Jack E. Jones Aug. 1980 139 p Supersedes NTIS/PS-79/0879; NTIS/PS-78/0878
(PB80-814015; NTIS/PS-79/0879; NTIS/PS-78/0878) Avail: NTIS HC $30.00/MF $30.00 CSCL 09B

A bibliography containing 134 abstracts is given covering aspects of computer networks, including hardware, software, data transmission, time sharing, and applicable theory to network design. The ARPA network, the OCTOPUS network, the TENEX system, distributed networks, and other such systems are cited. GRA

63 CYBERNETICS

Includes feedback and control theory.

For related information see also *54 Man/System Technology and Life Support*.

N81-14680# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany). Inst. Fuer Dynamik der Flugsysteme.
PERFORMED EVALUATION OF UNCONSTRAINED OPTIMIZATION TECHNIQUES
Dieter Kraft and Gerhard Kreisselmeir Sep. 1979 59 p refs In GERMAN; ENGLISH summary Report also announced as translation (ESA-TT-669)
(DFVLR-Mitt-79-21) Avail: NTIS HC A04/MF A01; DFVLR, Cologne DM 12,80

Numerical optimization techniques are a tool in the analysis of dynamical systems as well as in the synthesis of their control algorithms. Algorithms for unconstrained optimization of function of serveral variables are described. Their performance as implemented computer software is evaluated by comparing results of test examples. Unconstrained optimization is not only important by itself for unconstrained problems but also plays a significent role as core algorithm in constrained optimization (penalty and multiplier methods). Author

N81-14681# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany). Inst. fuer Dynamik der Flugsysteme
OPTIMAL CONTROL NONLINEAR PROGRAMMING, SPLINE INTERPOLATION, NUMERICAL SOFTWARE
Dieter Kraft Feb. 1980 126 p refs In GERMAN; ENGLISH summary
(DFVLR-Mitt-80-03) Avail: NTIS HC A07/MF A01; DFVLR, Cologne DM 28,20

FORTRAN subroutines for the numerical solution of optimal control problems based on parametric control models are described. A user's guide is given by an example. The complete program listings are appended together with the example output. Author

N81-14682# Stichting Mathematisch Centrum, Amsterdam (Netherlands). Dept. of Operations Research.
DUALITY IN POLYNOMIAL MODELS WITH SOME APPLICATIONS TO GEOMETRIC CONTROL THEORY
Paul A. Fuhrmann (Ben Gurion Univ. of the Negev, Beer Sheva, Israel) Dec. 1979 27 p refs Submitted for publication
(MC-BW-115/79) Avail: NTIS HC A03/MF A01; Stichting Math. Centrum, Amsterdam FL 3

Duality is studied in the context of polynomial models for linear systems. The output injection group, the dual of the feedback group, is studied and a polynomial characterization of (C,A)-invariant subspaces as well as of the maximal reachability subspace contained in ker C is given. Author

N81-14683# Stichting Mathematisch Centrum, Amsterdam (Netherlands). Dept. of Applied Mathematics.
ON A CLASS OF NEARLY SINGULAR OPTIMAL CONTROL PROBLEMS
J. Grasman Jan. 1980 15 p refs
(MC-TW-196/80) Avail: NTIS HC A02/MF A01; Stichting Math. Centrum Amsterdam FL 3

For a class of linear singular optimal control problems with a non-unique singular arc, the solution of the corresponding nearly singular problem is analyzed and a limit solution based on formal singular perturbations is derived. The result is verified by using an asymptotic power series expansion satisfying the Riccati equation of the nearly singular problem. Author

N81-14684# Stichting Mathematisch Centrum, Amsterdam (Netherlands). Dept. of Applied Mathematics.
ON A CLASS OF OPTIMAL CONTROL PROBLEMS WITH AN ALMOST COST FREE SOLUTION
J. Grasman Jul. 1980 21 p refs Submitted for publication
(MC-TW-204/80) Avail: NTIS HC A02/MF A01; Stichting Math. Centrum, Amsterdam FL 3

For a class of linear singular optimal control problems with a nonunique singular arc, the solution of the corresponding nearly singular problem is analyzed and a limit solution based on formal singular perturbations is derived. A rigorous proof of the correctness of the result is given by constructing a convergent power series satisfying the Riccati equation of the nearly singular problem. Author

N81-14685# Sheffield Univ. (England). Dept. Control Engineering.
A REVIEW OF CONTROL THEORY FOR DIGITAL SYSTEMS
D. H. Owens Sep. 1980 12 p refs Presented at IEE Vacation School on Ind. Digital and Microprocessor-Based Control Systems, 14-19 Sep. 1980
(RR-120) Avail: NTIS HC A02/MF A01

Although digital systems theory can be regarded as a subject in its own right, it is important to recognize that, in its application to control systems design, it is frequently the case that the elements of a digital system are derived from dynamic systems with continuous characteristics by the operation of sampling. In particular it is almost always the case that the plant (i.e., the controlled object) has an underlying continuous character. For this reason the existence of a large body of continuous control theory must be acknowledged and it must be anticipated that many of the design techniques conceived for the control of continuous plant will be suitable, with only a few technical and conceptual changes, for application to digital controller design. For these reasons the following brief review of deterministic control theory applicable to digital systems will freely draw on control concepts for both continuous and discrete plant. The discrete aspects and, for simplicity of exposition, the general (multivariable) problem of the control of a plant is considered. L.F.M.

N81-14686# Brown Univ., Providence, R. I. Center for Dynamical Systems.
CONTROL OF DYNAMICAL SYSTEMS Annual Progress Report, 1 Sep. 1979 - 31 Aug. 1980
H. T. Banks and J. K. Hale 20 Sep. 1980 33 p refs
(Grant AF-AFOSR-3092-76; AF Proj. 2304)
(AD-A091704; AFOSR-80-1145TR) Avail: NTIS HC A03/MF A01 CSCL 12/1

Spline based approximation schemes for nonlinear nonautonomous functional differential equations control systems are discussed and it is shown how these may be employed in parameter estimation techniques. A sample of our numerical findings is also presented. GRA

N81-14687# School of Aerospace Medicine, Brooks AFB, Tex.
A CLASS OF SEQUENTIAL INPUT ADAPTIVE SYSTEMS Final Report, 1 Jan. - 1 Jul. 1979
David E. Greene Dec. 1979 18 p refs
(AF Proj. 2312)
(AD-A091655; SAM-TR-79-38) Avail: NTIS HC A02/MF A01 CSCL 12/1

A mathematical theory for first, second, and third order sequential input adaptive systems is presented. In these systems, a theoretical controller predicts the input at instants by n terms of a Taylor series representation of the input and effect

open-loop control over intervals to obtain nth order projected error responses. The second order system is the lowest order system of this class that describes the mean tracking behavior in a given antiaircraft artillery man-machine tracking system. Further, the second order system is a most plausible system consistent with limitations of the human controller and the manner in which the subjects were trained. GRA

N81-14688# Maryland Univ., College Park. Computer Vision Lab.
THREE DIMENSIONAL DIGITAL TECHNOLOGY Interim Report
Azriel Rosenfeld Sep. 1980 24 p refs
(Contract AF-AFOSR-3271-77; AF Proj. 2304)
(AD-A091045; CSC/TR-936; AFOSR-80-1038TR) Avail: NTIS HC A02/MF A01 CSCL 05/8

Basic concepts of connectedness, cavities, and holes are defined for subsets of three dimensional arrays. Three dimensional arcs and curves are also defined and characterized. GRA

N81-14689# National Technical Information Service, Springfield, Va.
CONTROL THEORY. CITATIONS FROM THE NTIS DATA BASE Progress Report, Aug. 1978 - Jul. 1980
Brian Carrigan Aug. 1980 273 p Supersedes NTIS/PS-79/0933; NTIS/PS-78/0925
(PB80-814395; NTIS/PS-79/0933; NTIS/PS-78/0925) Avail: NTIS HC $30.00/MF $30.00 CSCL 12B

A bibliography containing 266 abstracts is given which addresses automatic control, stochastic control, and feedback control, with multidisciplinary applications. Stabilization, optimization, and control of linear and nonlinear systems are included. GRA

64 NUMERICAL ANALYSIS

Includes iteration, difference equations, and numerical approximation.

N81-14690*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
NUMERICAL GRID GENERATION TECHNIQUES
1980 561 p refs Conf. held at NASA Langley Research Center, Hampton, Va., 6-7 Oct. 1980 Sponsored in part by Institute for Computer Applications in Science and Engineering, Hampton, Va.
(NASA-CP-2166) Avail: NTIS HC A24/MF A01 CSCL 12A

The state of the art in topology and flow geometry is presented. Solution techniques for partial differential equations are reviewed and included developments in coordinate transformations, conformal mapping, and invariant imbeddings. Applications of these techniques in fluid mechanics, flow geometry, boundary value problems, and fluidics are presented. For individual titles, see N81-14691 through N81-14727.

N81-14691*# Polytechnic Inst. of New York.
GRID GENERATION USING CLASSICAL TECHNIQUES
Gino Moretti *In* NASA. Langley Research Center Numerical Grid Generation Tech. 1980 p 1-36 refs (For primary document see N81-14690 05-64)
(Grant NSG-1248)
Avail: NTIS HC A24/MF A01 CSCL 12A

A brief historical review of conformal mapping and its applications to problems in fluid mechanics and electromagnetism is presented. The use of conformal mapping as a grid generator is described. The philosophy of the 'closed form' approach and its application to a Neumann problem is discussed. Karman-Trefftz mappings and grids for ablated, three dimensional bodies are also discussed. T.M.

N81-14692*# Mississippi State Univ., Mississippi State. Dept. of Aerospace Engineering.
GRID GENERATION USING DIFFERENTIAL SYSTEMS TECHNIQUES
Joe F. Thompson and C. Wayne Mastin *In* NASA. Langley Research Center Numerical Grid Generation Tech. 1980 p 37-72 refs (For primary document see N81-14690 05-64)
(Grants NSG-1577; NGR-25-001-055)
Avail: NTIS HC A24/MF A01 CSCL 12A

The errors in approximating the derivatives of a function by traditional central differences at grid points of a curvilinear coordinate system were examined. The implications concerning the accuracy of the numerical solution of a partial differential equation are explained by considering several numerical examples. Although this study only considers the two dimensional case, the techniques and implications are equally valid for three dimensional grids. An interesting feature of the error analysis is its simplicity. Most of the results follow by merely working with the truncation terms of some power series expansion. These series expansions also give rise to higher order difference approximations which can significantly reduce error when the grid spacing changes rapidly, as might be the case in problems with shock waves or thin boundary layers. Author

N81-14693*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
MESH GENERATION USING ALGEBRAIC TECHNIQUES
Peter R. Eiseman and Robert E. Smith *In its* Numerical Grid Generation Tech. 1980 p 73-120 refs (For primary document see N81-14690 05-64)
Avail: NTIS HC A24/MF A01 CSCL 12A

The solution of partial differential equations which describe physical phenomena by the use of coordinate transformations is described. The constraints of the problems are stated in geometric terms and include boundary constraints, uniformity constraints, and internal constraints. Algebraic mesh generations are very satisfactory for these constraints. T.M.

N81-14694*# SRI International Corp., Menlo Park, Calif.
GENERATION OF BOUNDARY AND BOUNDARY-LAYER FITTING GRIDS
C. M. Ablow and S. Schechter *In* NASA. Langley Research Center Numerical Grid Generation Tech. 1980 p 121-128 ref Sponsored in part by AFOSR (For primary document see N81-14690 05-64)
Avail: NTIS HC A24/MF A01 CSCL 12A

The details of extended physical processes, such as the gas dynamic flow over an airfoil, the reactive flow through a combustor, or the electric field in a multi-contact transistor, are understood by solving the differential equations of a mathematical model of the process. The accuracy of finite difference methods for the numerical solution of the equations is increased if the underlying mesh fits the region boundaries and is closely spaced in regions where the solution is rapidly varying. Automatic methods for producing a satisfactorily adjusted mesh were developed for one dimensional problems. In one simple, effective scheme of this kind the unknown function and the distribution of mesh modes are found simultaneously, the nodes being placed so that they correspond to points uniformly spaced on the solution curve. In a two dimensional generalization, the nodes correspond to points equally spaced on the solution surface in two directions that are as nearly orthogonal as possible. Examples of such meshes are shown. Author

N81-14695*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
AN ELECTROSTATIC ANALOG FOR GENERATING CASCADE GRIDS
John Jay Adamczyk *In* NASA. Langley Research Center Numerical Grid Generation 1980 p 129-142 (For primary document see N81-14690 05-64)
Avail: NTIS HC A24/MF A01 CSCL 12A

Accurate and efficient numerical simulation of flows through turbomachinery blade rows depends on the topology of the computational grids. These grids must reflect the periodic nature of turbomachinery blade row geometries and conform to the blade shapes. Three types of grids can be generated that meet these minimal requirements: through-flow grids, O-type grids, and C-type grids. A procedure which can be used to generate all three types of grids is presented. The resulting grids are orthogonal and can be stretched to capture the essential physics of the flow. A discussion is also presented detailing the extension of the generation procedure to three dimensional geometries. Author

N81-14696*# Lockheed Missiles and Space Co., Huntsville, Ala. Research and Engineering Center.

FINITE DIFFERENCE GRID GENERATION BY MULTIVARIATE BLENDING FUNCTION INTERPOLATION

Peter G. Anderson and Lawrence W. Spradley *In* NASA. Langley Research Center Numerical Grid Generation Tech. 1980 p 143-156 refs (For primary document see N81-14690 05-64)
(Contracts NAS1-15341; NAS1-15783; NAS1-15795)
Avail: NTIS HC A24/MF A01 CSCL 12A

The General Interpolants Method (GIM) code which solves the multidimensional Navier-Stokes equations for arbitrary geometric domains is described. The geometry module in the GIM code generates two and three dimensional grids over specified flow regimes, establishes boundary condition information and computes finite difference analogs for use in the GIM code numerical solution module. The technique can be classified as an algebraic equation approach. The geometry package uses multivariate blending function interpolation of vector-values functions which define the shapes of the edges and surfaces bounding the flow domain. By employing blending functions which conform to the cardinality conditions the flow domain may be mapped onto a unit square (2-D) or unit cube (3-D), thus producing an intrinsic coordinate system for the region of interest. The intrinsic coordinate system facilitates grid spacing control to allow for optimum distribution of nodes in the flow domain. Author

N81-14697*# Lockheed-Georgia Co., Marietta.

COMPONENT-ADAPTIVE GRID EMBEDDING

E. H. Atta *In* NASA. Langley Research Center Numerical Grid Generation Tech. 1980 p 157-174 ref (For primary document see N81-14690 05-64)
Avail: NTIS HC A24/MF A01 CSCL 12A

One of the major problems related to transonic flow prediction about realistic aircraft configuration is the generation of a suitable grid which encompasses such configurations. In general, each aircraft component (wing, fuselage, nacelle) requires a grid system that is usually incompatible with the grid systems of the other components; thus, the implementation of finite-difference methods for such geometrically-complex configurations is a difficult task. An approach was developed to treat such a problem. The basic idea is to generate different grid systems, each suited for a particular component. Thus, the flow field domain is divided into overlapping subdomains of different topology. These grid systems are then interfaced with each other in such a way that stability, convergence speed and accuracy are maintained. Author

N81-14698*# Tennessee Univ., Knoxville.

GRID AND METRIC GENERATION ON THE ASSEMBLY OF LOCALLY BI-QUADRATIC COORDINATE TRANSFORMATIONS

A. J. Baker and P. D. Manhardt *In* NASA. Langley Research Center Numerical Grid Generation Tech. 1980 p 175-180 Prepared in cooperation with Florida Power Corp. and Dravo Corp. (For primary document see N81-14690 05-64)
(Grant AF-AFOSR-0005-79)
Avail: NTIS HC A24/MF A01 CSCL 12A

The generation of metric coefficients of the coordinate transformation from a generally curved-sided domain boundary to the unit square (cube) is required for efficient solution algorithms in computational fluid mechanics. An algebraic procedure is presented for establishment of these data on the union of arbitrarily selected sub-domains of the global solution domain. A uniformly smooth progression of grid refinement is readily generated, including multiple specification of refined grids for a given macro-element domain discretization. The procedure is illustrated as generally applicable to non-simply connected domains in two and three dimensions. Author

N81-14699*# Stanford Univ., Calif. Dept. of Computer Science.

GRID GENERATION FOR TIME DEPENDENT PROBLEMS: CRITERIA AND METHODS

Marsha Berger, William Gropp, and Joseph Oliger *In* NASA. Langley Research Center Numerical Grid Generation Tech. 1980 p 181-188 (For primary document see N81-14690 05-64)
Avail: NTIS HC A24/MF A01 CSCL 12A

The problem of generating local mesh refinements when solving time dependent partial differential equations was examined. The problem of creating an appropriate grid, given a mesh function h defined over the spatial domain is discussed. A data structure which permits efficient use of the resulting grid is described. A good choice for h is an estimate of the local truncation error, and several ways to estimate it are discussed. The efficiency and implementation problems of these error estimates were compared. Author

N81-14700*# Sandia Labs., Albuquerque, N. Mex.

GENERATIONS OF ORTHOGONAL SURFACE COORDINATES

F. G. Blottner and J. B. Moreno *In* NASA. Langley Research Center Numerical Grid Generation Tech. 1980 p 189-192 refs (For primary document see N81-14690 05-64)
(Contract DE-AC04-76DP-00789)
Avail: NTIS HC A24/MF A01 CSCL 12A

Two generation methods were developed for three dimensional flows where the computational domain normal to the surface is small. With this restriction the coordinate system requires orthogonality only at the body surface. The first method uses the orthogonal condition in finite-difference form to determine the surface coordinates with the metric coefficients and curvature of the coordinate lines calculated numerically. The second method obtains analytical expressions for the metric coefficients and for the curvature of the coordinate lines. T.M.

N81-14701*# New York Univ., N. Y. Courant Institute of Mathematical Sciences.

AN ADAPTIVE COMPUTATION MESH FOR THE SOLUTION OF SINGULAR PERTURBATION PROBLEMS

Jeremiah U. Brackbill and J. Saltzman *In* NASA. Langley Research Center Numerical Grid Generation Tech. 1980 p 193-196 refs (For primary document see N81-14690 05-64)
Avail: NTIS HC A24/MF A01 CSCL 12A

In singular perturbation problems, control of zone size variation can affect the effort required to obtain accurate, numerical solutions of finite difference equations. The mesh is generated by the solution of potential equations. Numerical results for a singular perturbation problem in two dimensions are presented. The mesh was used in calculations of resistive magnetohydrodynamic flow in two dimensions. T.M.

N81-14702*# United Technologies Corp., East Hartford, Conn. Computational Fluids Dynamics Group.

A NEW COORDINATE TRANSFORMATION FOR TURBULENT BOUNDARY LAYER FLOWS

J. E. Carter, D. E. Edwards, and M. J. Werle *In* NASA. Langley Research Center Numerical Grid Generation Tech. 1980 p 197-212 (For primary document see N81-14690 05-64)
Avail: NTIS HC A24/MF A01 CSCL 12A

The transformation permits a uniform mesh to be used in the computational coordinate which extends across the layer. This coordinate transformation uses the local value of the skin friction coefficient to scale the thickness of the wall layer region, and the local maximum value of turbulent viscosity to scale the boundary-layer thickness. Results are presented for two dimensional boundary layers in both positive and negative pressure gradients and comparisons are made with experimental data and conventional variable-grid results for low speed turbulent boundary-layers. The cases chosen illustrate the capability of this new transformation to capture the boundary layer growth over the full extent of laminar, transitional, and turbulent flow with no grid adjustment as well as its ability to consistently enlarge the wall layer region for accurate shear stress representation. Results of mesh refinement studies using the new coordinate transformation are presented. Author

N81-14703*# Naval Ship Research and Development Center, Bethesda, Md. Computation, Mathematics, and Logistics Dept.

GENERATION OF ORTHOGONAL BOUNDARY-FITTED COORDINATE SYSTEMS

Roderick M. Coleman *In* NASA. Langley Research Center Numerical Grid Generation Tech. 1980 p 213-220 (For primary document see N81-14690 05-64)
Avail: NTIS HC A24/MF A01 CSCL 12A

A method is presented for computing orthogonal boundary fitted coordinate systems for geometries with coordinate

distributions specified on all boundaries. The system which has found most extensive use in generating boundary fitted grids is made up of Poisson equations, of which the functions P and Q provide a means for controlling the spacing and density of grid lines in the coordinate system. While questions remain concerning the existence and uniqueness of orthogonal systems, the generating method presented adds to the available, useful techniques for constructing these systems. E.D.K.

N81-14704*# University of Eastern Illinois, Charleston. Dept. of Mathematics.

NONLINEAR GRID ERROR EFFECTS ON NUMERICAL SOLUTION OF PARTIAL DIFFERENTIAL EQUATIONS

S. K. Dey *In* NASA. Langley Research Center Numerical Grid Generation Tech. 1980 p 221-230 refs Sponsored in part by Minna-James-Heineman-Stiftung Foundation of West Germany (For primary document see N81-14690 05-64)

Avail: NTIS HC A24/MF A01 CSCL 12A

Finite difference solutions of nonlinear partial differential equations require discretizations and consequently grid errors are generated. These errors strongly affect stability and convergence properties of difference models. Previously such errors were analyzed by linearizing the difference equations for solutions. Properties of mappings of decadence were used to analyze nonlinear instabilities. Such an analysis is directly affected by initial/boundary conditions. An algorithm was developed, applied to nonlinear Burgers equations, and verified computationally. A preliminary test shows that Navier-Stokes equations may be treated similarly. E.D.K.

N81-14705*# Washington Univ., Seattle. Dept. of Aeronautics and Astronautics.

GRID GENERATION USING COARSE, SMOOTH FINITE ELEMENTS

Lawrence J. Dickson *In* NASA. Langley Research Center Numerical Grid Generation Tech. 1980 p 231-240 (For primary document see N81-14690 05-64)

Avail: NTIS HC A24/MF A01 CSCL 12A

Grid quality solutions of a wide variety of equations can be generated to fit reasonable functional boundary conditions in two dimensions using very coarse rectangular finite elements. Some wavy operators (with no natural variational expression) were tried in order to demonstrate the method's versatility. E.D.K.

N81-14706*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

FAST GENERATION OF BODY CONFORMING GRIDS FOR 3-D

Ojordje Dulikravich *In* NASA. Langley Research Center Numerical Grid Generation Tech. 1980 p 241-252 refs (For primary document see N81-14690 05-64)

Avail: NTIS HC A24/MF A01 CSCL 12A

A fast algorithm was developed for accurately generating boundary conforming, three dimensional, consecutively refined, computational grids applicable to arbitrary axial turbomachinery geometry. The method is based on using a single analytic function to generate two dimensional grids on a number of coaxial axisymmetric surfaces positioned between the hub and the shroud. These grids are of the 'O' type and are characterized by quasi-orthogonality, geometric periodicity, and an adequate resolution throughout the flowfield. Due to the built in additional nonorthogonal coordinate stretching and shearing, the grid lines leaving the trailing of the blade end at downstream infinity, this simplifying the numerical treatment of the three dimensional trailing vortex sheet. Author

N81-14707*# Aeronautical Research Inst. of Sweden, Stockholm.

THREE DIMENSIONAL SPLINE-GENERATED COORDINATE TRANSFORMATIONS FOR GRIDS AROUND WING-BODY CONFIGURATIONS

Lars-Erik Eriksson *In* NASA. Langley Research Center Numerical Grid Generation Tech. 1980 p 253-264 (For primary document see N81-14690 05-64)

Avail: NTIS HC A24/MF A01 CSCL 12A

A direct algebraic method was developed and applied to generate three dimensioanl grids around wing-body configurations. The method used is a generalized transfinite interpolation method which generates the desired coordinate transformation using geometric data only on the boundaries of the domain of interest. The geometric data that can be specified includes not only coordinates on the boundaries but also out-of-surface parametric derivatives that give a very precise control over the transformation in the vicinity of the surface. In addition to this, the method gives good control over the stretching of the mesh between different boundaries. Author

N81-14708*# Aircraft Research Association Ltd., Bedford (England).

AN INVESTIGATION INTO GRID PATCHING TECHNIQUES

C. R. Forsey, M. G. Edwards, and M. P. Carr *In* NASA. Langley Research Center Numerical Grid Generation Tech. 1980 p 265-294 Sponsored in part by the Ministry of Defence, England (For primary document see N81-14690 05-64)

Avail: NTIS HC A24/MF A01 CSCL 12A

In the past decade significant advances were made using flow field methods in the calculation of external transonic flows over aerodynamic configurations. It is now possible to calculate inviscid transonic flow over three dimensional configurations by solving the potential equation. However, with the exception of the transonic small disturbance methods which have the advantage of a simple cartesian grid, the configurations over which it is possible to calculate such flows are relatively simple. The major reason for this is the difficulty of producing compatibility between grid generation and flow equation solutions. The main programs in use, use essentially analytic transformations for prescribed configurations and, as such, are not easy to extend. While there is work in progress to extend this type of system to a limited extent, the long term effort is directed towards a more general approach. This approach should not be restricted to producing grid systems in isolation but rather a consideration of the overall problem of flow field solution. E.D.K.

N81-14709*# Cincinnati Univ., Ohio.

BOUNDARY-FITTED COORDINATES FOR REGIONS WITH HIGHLY CURVED BOUNDARIES AND REENTRANT BOUNDARIES

U. Ghia and K. N. Ghia *In* NASA. Langley Research Center Numerical Grid Generation Tech. 1980 p 295-306 (For primary document see N81-14690 05-64)

Avail: NTIS HC A24/MF A01 CSCL 12A

A procedure was developed using the differential equation approach for generating boundary fitted coordinates for regions with highly curved boundaries as well as reentrant boundaries, such as those encountered in breaking surface waves. The resulting coordinates are nearly orthogonal and can provide adequate resolution even in the reentrant region. Consistent treatment of end boundaries and the use of a systematic initialization scheme and advanced implicit numerical solution techniques make the procedure highly efficient. The method developed for implicit enforcement of the periodicity boundary condition should be beneficial in the analysis of turbomachinery flow applications. Author

N81-14710*# National Aeronautics and Space Administration, Washington, D. C. OAST Aerodynamics Office.

A SIMPLE NUMERICAL ORTHOGONAL COORDINATE GENERATOR FOR FLUID DYNAMIC APPLICATIONS

Randolph A. Graves, Jr. *In* NASA. Langley Research Center Numerical Grid Generation Tech. 1980 p 307-314 (For primary document see N81-14690 05-64)

Avail: NTIS HC A24/MF A01 CSCL 12A

An application of a simple numerical technique which allows for the rapid construction of orthogonal coordinate systems about two dimensional and axisymmetric bodies is presented. The technique is based on a predictor corrector numerical method. It can be used to generate orthogonal meshes which have unequally spaced points in two directions. These orthogonal meshes in their transformed computational plane are, however, equally spaced so that the differencing for the metric coefficients and the fluid dynamic equation terms can be easily determined using equally spaced central finite differences. Solutions to the Navier-Stokes equations for flow over blunt bodies with reverse curvature are presented. The coupling of the time dependent

fluid dynamic equations and the coordinate generator worked well with no undesirable effects noted. M.G.

N81-14711*# Science Applications, Inc., McLean, Va.
A THREE-DIMENSIONAL BODY-FITTED COORDINATE SYSTEM FOR FLOW FIELD CALCULATIONS ON ASYMMETRIC NOSETIPS
Darryl W. Hall *In* NASA. Langley Research Center Numerical Grid Generation Tech. 1980 p 315-328 refs (For primary document see N81-14690 05-64)
Avail: NTIS HC A24/MF A01 CSCL 12A

A three dimensional body-fitted coordinate system developed for use in the calculation of inviscid flows over ablated, asymmetric reentry vehicle nosetips is described. Because of the potential geometric asymmetries, no standard coordinate system (e.g., spherical, axisymmetric reference surface-normal) is capable of being closely aligned with the nosetip surface. To generate a 3-D, body-fitted coordinate system an analytic mapping procedure is applied that is conformal within each meridional plane of the nosetip; these transformations are then coupled circumferentially to yield a three dimensional coordinate system. The mappings used are defined in terms of hinge points, which are points selected to approximate the body contours in each meridional plane. The selection of appropriate hinge points was automated to facilitate the use of the resulting nosetip flow field code.M.G.

N81-14712*# Georgia Inst. of Tech., Atlanta. School of Mathematics.
CONFORMAL MAPPING OF MULTIPLY CONNECTED REGIONS ONTO REGIONS WITH SPECIFIED BOUNDARY SHAPES
Andrew N. Harrington *In* NASA. Langley Research Center Numerical Grid Generation Tech. 1980 p 329-330 (For primary document see N81-14690 05-64)
Avail: NTIS HC A24/MF A01 CSCL 12A

A numerical procedure to compute the conformal mapping of a given n-tuply connected region onto a region with any specified boundary shapes and with several possible normalizations is developed and implemented. Procedures for calculating translation and magnification parameters are given. M.G.

N81-14713*# Boeing Military Airplane Development, Seattle, Wash. Advanced Airplane Branch.
BOUNDARY-FITTED COORDINATE SYSTEMS FOR ARBITRARY COMPUTATIONAL REGIONS
Edward J. Kowalski *In* NASA. Langley Research Center Numerical Grid Generation Tech. 1980 p 331-354 (For primary document see N81-14690 05-64)
Avail: NTIS HC A24/MF A01 CSCL 12A

The method of Smith and Wiegel was used to generate meshes for mixer lobes and subsonic inlets that are compatible with flow analysis codes requiring a boundary fitted coordinate system. Successful application of this mesh generator required development of procedures to distribute the mesh points along the boundaries, to regulate the dependence of the connecting function to the local boundary slope, to concentrate the mesh into regions of special interest, and to modify the mesh grid so that it possessed a smooth progression of cell metrics and cell volumes in all directions. The method of Smith and Wiegel when coupled with the extensions mentioned above has proven to be easy to use and control for the inlet and mixer lobe geometries investigated. R.C.T.

N81-14714*# Boeing Co., Seattle, Wash.
GRID GENERATION FOR GENERAL THREE-DIMENSIONAL CONFIGURATIONS
K. D. Lee, M. Huang, N. J. Yu, and P. E. Rubbert *In* NASA. Langley Research Center Numerical Grid Generation Tech. 1980 p 355-366 (For primary document see N81-14690 05-64)
Avail: NTIS HC A24/MF A01 CSCL 12A

A suitable grid system for complex three dimensional configurations such as wing/body/nacelle shape for the solution of nonlinear transonic flow problems was constructed. Two approaches were explored based on Thompson's body fitted coordinate concept. The most general approach was to divide the computational domain into multiple rectangular blocks where the configuration itself was also represented by a set of blocks whose structure follows the natural lines of the configuration. The block structured grid system was adaptable to complex configurations and gives good grid quality near physical corners. However, it introduced algorithm issues for the flow solution concerning the treatment of nonanalytic grid block boundaries and nonstandard grid cells. These issues were explored in relation to the grid generation. A more limited approach treats a wing/body configuration with only a single rectangular block in computational space. The issues involving nonstandard cells were avoided, but other limitations on grid resolution appear. Both a linear and a nonlinear system of grid generation equations were developed including methods of grid control. R.C.T.

N81-14715*# Illinois Univ., Urbana. Coordinated Science Lab.
EFFECT OF GRID SYSTEM ON FINITE ELEMENT CALCULATION
K. D. Lee and S. M. Yen *In* NASA. Langley Research Center Numerical Grid Generation Tech. 1980 p 367-376 (For primary document see N81-14690 05-64)
Avail: NTIS HC A24/MF A01 CSCL 12A

Detailed parametric studies of the effect of grid system on finite element calculation for potential flows were made. These studies led to the formulation of a design criteria for optimum mesh system and the development of two methods to generate the optimum mesh system. The guidelines for optimum mesh system are: (1) the mesh structure should be regular; (2) the element should be as regular and equilateral as possible; (3) the distribution of size of element should be consistent with that of flow variables to insure maximum uniformity in error distribution; (4) for non-Dirichlet boundary conditions, smaller boundary elements or higher order interpolation functions should be used; and (5) the mesh should accommodate the boundary geometry as accurately as possible. The results of the parametric studies are presented. E.D.K.

N81-14716*# PEDA Corp., Palo Alto, Calif.
SOME ASPECTS OF ADAPTING COMPUTATIONAL MESH TO COMPLEX FLOW DOMAINS AND STRUCTURES WITH APPLICATION TO BLOWN SHOCK LAYER AND BASE FLOW
Charles K. Lombard, M. P. Lombard, G. P. Menees, and J. Y. Yang *In* NASA. Langley Research Center Numerical Grid Generation Tech. 1980 p 377-384 refs (For primary document see N81-14690 05-64)
Avail: NTIS HC A24/MF A01 CSCL 12A

Several aspects connected with the notion of computation with flow oriented mesh systems are presented. Simple, effective approaches to the ideas discussed are demonstrated in current applications to blown forebody shock layer flow and full bluff body shock layer flow including the massively separated wake region. E.D.K.

N81-14717*# Hughes Aircraft Co., Culver City, Calif. Missiles System Group.
AN ANALYTICAL TRANSFORMATION TECHNIQUE FOR GENERATING UNIFORMLY SPACED COMPUTATIONAL MESH
Youn H. Oh *In* NASA. Langley Research Center Numerical Grid Generation Tech. 1980 p 385-398 (For primary document see N81-14690 05-64)
(Grant NsG-1087)
Avail: NTIS HC A24/MF A01 CSCL 12A

An analytical transformation method which can map arbitrary physical coordinate grid distribution into desired computational coordinate with uniform grid distribution is derived. The transformation function and its higher derivatives are differentiable. Salient features include; (1) precise control of grid sizes; (2) more than one location of clustered grids; (3) exact positioning of particular computational nodes in the physical plane; and (4) ensuring several patches of uniformly spaced grids in the physical plane for the higher accuracies (such as at the boundaries), etc., while keeping the variation of grid spacing continuous to avoid numerical instability. Author

N81-14718*# Naval Ship Research and Development Center, Bethesda, Md. Computation, Mathematics, and Logistics Dept.
APPLICATION OF THE MULTIGRID METHOD TO GRID GENERATION

Samuel Ohring *In* NASA. Langley Research Center Numerical Grid Generation Tech. 1980 p 399-408 ref (For primary document see N81-14690 05-64)
Avail: NTIS HC A24/MF A01 CSCL 12A

The multigrid method (MGM), used to numerically solve the pair of nonlinear elliptic equations commonly used to generate two dimensional boundary-fitted coordinate systems is discussed. Two different geometries are considered: one involving a coordinate system fitted about a circle and the other selected for an impinging jet flow problem. Two different relaxation schemes are tried: one is successive point overrelaxation and the other is a four-color scheme vectorizeable to take advantage of a parallel processor computer for greater computational speed. Results using MGM are compared with those using SOR (doing successive overrelaxations with the corresponding relaxation scheme on the fine grid only). It is found that MGM becomes significantly more effective than SOR as more accuracy is demanded and as more corrective grids, or more grid points, are used. For the accuracy required, it is found that MGM is two to three times faster than SOR in computing time. With the four-color relaxation scheme as applied to the impinging jet problem, the advantage of MGM over SOR is not as great. This may be due to the effect of a poor initial guess on MGM for this problem. M.G.

N81-14719*# Iowa State Univ. of Science and Technology, Ames. Dept. of Aerospace Engineering.
GRID EVOLUTION IN TIME ASYMPTOTIC PROBLEMS
Man Mohan Rai and D. A. Anderson *In* NASA. Langley Research Center Numerical Grid Generation Tech. 1980 p 409-430 refs (For primary document see N81-14690 05-64)
Avail: NTIS HC A24/MF A01 CSCL 12A

A technique for generating systems of coordinates for solving time asymptotic problems is described which provides a simple way of moving the mesh points in physical space and reduces the error in the solution relative to that obtained using a fixed mesh. First order partial differential equations are formulated for the grid point velocity in transient problems. Local flow information and boundary motion are used to determine the interior grid point motion. M.G.

N81-14720*# Waterloo Univ. (Ontario). Dept. of Computer Science.
A TWO DIMENSIONAL MESH VERIFICATION ALGORITHM
R. Bruce Simpson *In* NASA. Langley Research Center Numerical Grid Generation Tech. 1980 p 431-436 (For primary document see N81-14690 05-64)
Avail: NTIS HC A24/MF A01 CSCL 12A

A two dimensional mesh verification algorithm is discussed which assumes that a finite element mesh is represented in a program by lists of data, i.e., vertex coordinates, element incidences, boundary data, which describe a collection of triangles. A set of conditions are placed on the triangles (i.e., on the list data) which ensure that the triangles tile a region and which also can be verified by the algorithm. M.G.

N81-14721*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
GENERATION OF C-TYPE CASCADE GRIDS FOR VISCOUS FLOW COMPUTATION
Peter M. Sockol *In* NASA. Langley Research Center Numerical Grid Generation Tech. 1980 p 437-448 refs (For primary document see N81-14690 05-64)
Avail: NTIS HC A24/MF A01 CSCL 12A

A rapid procedure for generating C-type cascade grids suitable for viscous flow computations in turbomachinery blade rows is presented. The resulting mesh is periodic from one blade passage to the next, nearly orthogonal, and continuous across the wake downstream of a blade. The procedure employs a pair of conformal mappings that take the exterior of the cascade into the interior of an infinite strip with curved boundaries. The final transformation to a rectangular computational domain is accomplished numerically. The boundary values are obtained from a panel solution of an integral equation and the interior values by a rapid ADI solution of Laplace's equation. Examples of C-type grids are presented for both compressor and turbine blades and the extension of the procedure to three dimensions is briefly outlined. M.G.

N81-14722*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
NUMERICAL GENERATION OF TWO-DIMENSIONAL GRIDS BY THE USE OF POISSON EQUATIONS WITH GRID CONTROL AT BOUNDARIES
Reese L. Sorenson and Joseph L. Steger *In* NASA. Langley Research Center Numerical Grid Generation Tech. 1980 p 449-462 Prepared in cooperation with Flow Simulations, Inc., Sunnyvale, Calif. (For primary document see N81-14690 05-64)
Avail: NTIS HC A24/MF A01 CSCL 12A

A method for generating boundary-fitted, curvilinear, two dimensional grids by the use of the Poisson equations is presented. Grids of C-type and O-type were made about airfoils and other shapes, with circular, rectangular, cascade-type, and other outer boundary shapes. Both viscous and inviscid spacings were used. In all cases, two important types of grid control can be exercised at both inner and outer boundaries. First is arbitrary control of the distances between the boundaries and the adjacent lines of the same coordinate family, i.e., stand-off distances. Second is arbitrary control of the angles with which lines of the opposite coordinate family intersect the boundaries. Thus, both grid cell size (or aspect ratio) and grid cell skewness are controlled at boundaries. Reasonable cell size and shape are ensured even in cases wherein extreme boundary shapes would tend to cause skewness or poorly controlled grid spacing. An inherent feature of the Poisson equations is that lines in the interior of the grid smoothly connect the boundary points (the grid mapping functions are second order differentiable). M.G.

N81-14723*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
USE OF HYPERBOLIC PARTIAL DIFFERENTIAL EQUATIONS TO GENERATE BODY FITTED COORDINATES
Joseph L. Steger and Reese L. Sorenson *In* NASA. Langley Research Center Numerical Grid Generation Tech. 1980 p 463-478 Prepared in cooperation with Flow Simulations, Inc., Sunnyvale, Calif. (For primary document see N81-14690 05-64)
Avail: NTIS HC A24/MF A01 CSCL 12A

The hyperbolic scheme is used to efficiently generate smoothly varying grids with good step size control near the body. Although only two dimensional applications are presented, the basic concepts are shown to extend to three dimensions. R.C.T.

N81-14724*# Engineering Analysis, Inc., Huntsville, Ala.
CURVILINEAR GRIDS FOR SINUOUS RIVER CHANNELS
Frank B. Tatom, William R. Waldrop (Tennessee Valley Authority), and S. Ray Smith *In* NASA. Langley Research Center Numerical Grid Generation Tech. 1980 p 479-504 (For primary document see N81-14690 05-64)
Avail: NTIS HC A24/MF A01 CSCL 12A

In order to effectively analyze the flow in sinuous river channels, a curvilinear grid system was developed for use in the appropriate hydrodynamic code. The CENTERLINE program was designed to generate a two dimensional grid for this purpose. The Cartesian coordinates of a series of points along the boundaries of the sinuous channel represent the primary input to CENTERLINE. The program calculates the location of the river centerline, the distance downstream along the centerline, and both radius of curvature and channel width as a function of such distance downstream. These parameters form the basis for the generation of the curvilinear grid. Based on input values for longitudinal and lateral grid spacing, the corresponding grid system is generated and a file is created containing the appropriate parameters for use in the associated explicit finite difference hydrodynamic programs. Because of the option for a nonuniform grid, grid spacing can be concentrated in areas containing the largest flow gradients. R.C.T.

N81-14725*# McDonnell Aircraft Co., St. Louis, Mo.
GRID GENERATION FOR TWO-DIMENSIONAL FINITE ELEMENT FLOWFIELD COMPUTATION
Kenneth E. Tatum *In* NASA. Langley Research Center Numerical Grid Generation Tech. 1980 p 505-518 (For primary document see N81-14690 05-64)
Avail: NTIS HC A24/MF A01 CSCL 12A

The finite element method for fluid dynamics was used to develop a two dimensional mesh generation scheme. The method consists of shearing and conformal maps with upper and lower surfaces handled independently to allow sharp leading edges. The method also generates meshes of triangular or quadrilateral elements. R.C.T.

N81-14726*# Mississippi State Univ., Mississippi State. Dept. of Aerospace Engineering.

NUMERICAL GENERATION OF TWO-DIMENSIONAL ORTHOGONAL CURVILINEAR COORDINATES IN AN EUCLIDEAN SPACE

Z. U. A. Warsi and Joe F. Thompson *In* NASA. Langley Research Center Numerical Grid Generation Tech. 1980 p 519-544 refs (For primary document see N81-14690 05-64)

(Grants AF-AFOSR-2922-76; AF-AFOSR-0185-80)

Avail: NTIS HC A24/MF A01 CSCL 12A

A noniterative method for the numerical generation of orthogonal curvilinear coordinates for plane annular regions between two arbitrary smooth closed curves was developed. The basic generating equation is the Gaussian equation for an Euclidean space which is solved analytically. The method is applied in many cases and these test results demonstrate that the proposed method can be readily applied to a wide variety of problems. The method can also be used for simply connected regions only by obtaining the solution of the linear equation under the changed boundary conditions. R.C.T.

N81-14727*# Georgia Inst. of Tech., Atlanta.

A BODY-FITTED CONFORMAL MAPPING METHOD WITH GRID-SPACING CONTROL

James C. Wu and U. Gulcat *In* NASA. Langley Research Center Numerical Grid Generation Tech. 1980 p 545-560 (For primary document see N81-14690 05-64)

Avail: NTIS HC A24/MF A01 CSCL 12A

It is demonstrated by analyses and by numerical illustrations that any arbitrarily prescribed contour, open or closed, can be mapped conformally onto a simple contour, such as a unit circle, using any arbitrarily prescribed distribution of scale factor of transformation. This flexibility of selecting a scale factor distribution on the contour is not in violation of the well-known Riemann's uniqueness theory for conformal mapping. R.C.T.

N81-14728# Stichting Mathematisch Centrum, Amsterdam (Netherlands). Dept. of Operations Research.

A RECURSIVE APPROACH TO THE IMPLEMENTATION OF ENUMERATIVE METHODS

J. K. Lenstra and A. H. G. RinnooyKan (Erasmus Univ.) Jan. 1980 21 p refs Submitted for publication

(MC-BW-116/80) Avail: NTIS HC A02/MF A01; Stichting Math. Centrum, Amsterdam FL 3

Algorithms for generating permutations by means of both lexicographic and minimum change methods are presented. A recursive approach to their implementation leads to transparent procedures that are proved correct; moreover, they turn out to be no less efficient than previous iterative generators. Some applications of explicit enumeration to combinatorial optimization problems, exploiting the minimum change property, are indicated. A recursive approach to implicit enumeration is discussed.

Author

N81-14729# Stichting Mathematisch Centrum, Amsterdam (Netherlands). Dept. of Computer Science.

COMPUTING THE PERIMETER OF A SET OF RECTANGLES

Paul M. B. Vitanyi and Derrick Wood (McMaster Univ.) Nov. 1979 25 p refs Submitted for publication Sponsored in part by Netherlands Organization for the Advancement of Pure Research (ZWO)

(Grant NRC-A-7700)

(MC-IW-121/79) Avail: NTIS HC A02/MF A01; Stichting Math. Centrum, Amsterdam FL 3

An algorithm for computing the perimeter (sum of lengths of boundaries) of the area in the plane covered by a given set of n rectilinearly oriented rectangles is described. With some modifications, the algorithm also computes the measure (surface) of this area. For the latter task such an algorithm was available before. Our main thrust was a comparison of the worst case performances of the algorithms under various computational assumptions. The results strengthen the conjecture that theta (n) space and theta (n log n) time simultaneously is unattainable for the perimeter and measure problems when a realistic model of computation is assumed. The algorithms generalize easily to higher dimensions. Without substantially altering the time/storage requirements, the perimeter algorithm can be adapted to output the boundary of a set of intersecting rectangles (or intervals in d space), which may be useful in computer graphics. Author

N81-14730# Stichting Mathematisch Centrum, Amsterdam (Netherlands). Dept. of Numerical Mathematics.

A NOTE ON C(O) GALERKIN METHODS FOR TWO POINT BOUNDARY PROBLEMS

M. Bakker Nov. 1979 12 p refs Submitted for publication (MC-NW-73/79) Avail: NTIS HC A02/MF A01; Stichting Math. Centrum, Amsterdam FL 3

As is known, the o Galerkin solution of a two-point boundary problem using piecewise polynomial functions, has O(h to the 2k power) convergence at the knots, where k is the degree of the finite element space. In this note, it is proved that on any segment there are k-1 interior points where the Galerkin solution is of O(h to the k+2 power), one point better than the global order of convergence. These points are the Lobatto points.

Author

N81-14731# Stichting Mathematisch Centrum, Amsterdam (Netherlands). Dept. of Numerical Mathematics.

ON THE ECONOMIZATION OF STABILIZED RUNGE-KUTTA METHODS WITH APPLICATIONS TO PARABOLIC INITIAL VALUE PROBLEMS

B. P. Sommeijer and P. J. vanderHouwen Nov. 1979 23 p refs

(MC-NW-74/79) Avail: NTIS HC A02/MF A01; Stichting Math. Centrum, Amsterdam FL 3

A modification of Runge-Kutta methods is analyzed which leads for important classes of parabolic differential equations to a considerable reduction of the computational effort. The main characteristic of the modified methods is the replacement of the right hand side function of the differential equation by a cheaper function with roughly the same Jacobian matrix. Numerical experiments are reported and the results are compared with the results obtained by the unmodified Runge-Kutta method and by an ADI method. Author

N81-14732# Stichting Mathematisch Centrum, Amsterdam (Netherlands). Dept. of Numerical Mathematics.

MULTIPLE GRID METHODS FOR THE SOLUTION OF FREDHOLM INTEGRAL EQUATIONS OF THE SECOND KIND

P. W. Hemker and H. Schippers Nov. 1979 31 p refs Submitted for publication

(MC-NW-75/79) Avail: NTIS HC A03/MF A01; Stichting Math. Centrum, Amsterdam FL 4

Multiple grid methods are applied for the fast solution of the large non-sperse systems of equations that arise from the discretization of Fredholm integral equations of the second kind. Various multiple grid schemes, both with Nystrom and with direct interpolation are considered. For these iterative methods the rates of convergence are derived using the collectively compact operator theory by Annelone and Atkinson. Estimates for the asymptotic computational complexity are given, which show the the multiple grid schemes result in O(N squared) arithmetic operations. Author

N81-14733# Stichting Mathematisch Centrum, Amsterdam (Netherlands). Dept. of Numerical Mathematics.

LINEAR MULTISTEP METHODS AND THE CONSTRUCTION OF QUADRATURE FORMULAE FOR VOLTERRA INTEGRAL AND INTEGRO-DIFFERENTIAL EQUATIONS

P. H. M. Wolkenfelt Nov. 1979 50 p refs

(MC-NW-76/79) Avail: NTIS HC A03/MF A01; Stichting Math. Centrum, Amsterdam FL 6

The application of linear multistep methods to differential equations defining quadrature problems yields relations between the multistep coefficients and the quadrature weights. By means of these relations quadrature formula are constructed and analyzed

(in particular, properties of the weights are studied, and an asymptotic expression for the quadrature error is derived). The quadrature rules obtained in this way are used to define a class of step by step methods for solving first and second kind Volterra integral equations and integro-differential equations. Convergence and stability results for such methods are unified and extended. In particular, a new result is presented concerning the convergence of these methods for first kind equations. For Volterra integro-differential equations, stability regions are given for quadrature methods which are based on the backward differentiation formula. The connection between the asymptotic repetition factor and relative stability is discussed. Author

N81-14734# Stichting Mathematisch Centrum, Amsterdam (Netherlands). Dept. of Numerical Mathematics.
ON A CLASS OF EXPLICIT THREE-STEP RUNGE-KUTTA METHODS WITH EXTENDED REAL STABILITY INTERVALS
J. G. Verwer Dec. 1979 25 p refs Submitted for publication
(MC-NW-77/79) Avail: NTIS HC A02/MF A01; Stichting Math. Centrum, Amsterdam FL 3

The numerical integration of semi-discrete parabolic equations, written in the explicit, autonomous form y prime = f(y) is presented. A class of explicit, 3 step Runge-Kutta methods is considered of which the real boundaries of absolute stability are given by cu m for methods of order 1, and by cu m for methods of order 2. Here m denotes the number of f(y) evaluations per integration step. This number may be arbitrarily large. The paper also deals with a linearization of the formulas by which m-1 f(y) evaluations can be replaced by m-1 multiplications of Jacobian matrix with intermediate vectors. This means that for many problems the linearized schemes will be less expensive. A numerical example is given. R.C.T.

N81-14735# Stichting Mathematisch Centrum, Amsterdam (Netherlands). Dept. of Numerical Mathematics.
MODIFIED NYSTROEM METHODS FOR SEMI-DISCRETE HYPERBOLIC DIFFERENTIAL EQUATIONS
P. J. vanderHouwen Jan. 1980 20 p refs Submitted for publication
(MC-NW-78/80) Avail: NTIS HC A02/MF A01; Stichting Math. Centrum, Amsterdam FL 3

First and second order Nystrom type methods are derived for second order differential equations without first derivatives possesing the following properties: (1) the stability interval equals 4m squared, m denoting the number of stages per integration step; (2) the method is internally stable irrespective the value of m; (3) the storage requirements are limited; (4) the costs per integration step are one right hand side evaluation, one evaluation of Jacobian matrix and m-1 matrix-vector multiplications. These four properties are of interest in the integration of the usually very large systems of ordinary differential equations which are of hyperbolic type and of second order in time. Author

N81-14736# Stichting Mathematisch Centrum, Amsterdam (Netherlands). Dept. of Applied Mathematics.
A STUDY OF THE REPRESENTATIONS OF SL(2,C) USING NONINFINITESIMAL METHODS
M. T. Kosters (Leiden Univ.) Nov. 1979 30 p refs
(MC-TW-190/79) Avail: NTIS HC A03/MF A01; Stichting Mathematisch Centrum, Amsterdam FL 4

The (nonunitary) principal series of the Lie group SL(2,C) is studied using explicit expressions for the matrix elements with respect to certain K bases. In particular all subquotient representations of the principal series and all equivalences occurring among these are found. Using the subquotient theorem this allows the classification of the topologically completely irreducible representations of SL(2,C) on a Banach space. Calculating certain intertwining operators allows one to decide which representations can be made unitary by choosing a suitable inner product on the representation space. M.G.

N81-14737# Stichting Mathematisch Centrum, Amsterdam (Netherlands). Dept. of Applied Mathematics.
ON THE EXPANSION OF CONFLUENT HYPERGEOMETRIC FUNCTIONS IN TERMS OF BESSEL FUNCTIONS
N. M. Temme Sep. 1979 19 p refs Submitted for publication
(MC-TW-192/79) Avail: NTIS HC A02/MF A01; Stichting Math. Centrum, Amsterdam FL 3

For the confluent hypergeometric functions asymptotic expansions are given. The expansions contain modified Bessel functions. For real values of the parameters, rigorous error bounds are given. Author

N81-14738# Stichting Mathematisch Centrum, Amsterdam (Netherlands). Dept. of Applied Mathematics.
A PRECISE DEFINITION OF SEPARATION OF VARIABLES
T. H. Koornwinder Nov. 1979 27 p refs Submitted for publication
(MC-TW-194/79) Avail: NTIS HC A03/MF A01; Stichting Math. Centrum, Amsterdam FL 3

A precise and conceptual definition of separation of variables for partial differential equations is given. Necessary and sufficient conditions for a linear homogeneous second order partial differential equation to be separable into second order ordinary differential equations are derived. In the case of the Helmholtz equation on a Riemannian manifold these conditions coincide with the classical Stackel-Robertson conditions. It is proved that separability of Lu+u=0 (L second order partial differential operator in n variables) implies the existence of n linearly independent, mutually commuting second order operations, including L. Finally, it is shown that separable second order equations do have an underlying (formal) Riemannian manifold. Author

N81-14739# Stichting Mathematisch Centrum, Amsterdam (Netherlands). Dept. of Applied Mathematics.
HOW MANY JUMPS? VARIATIONAL CHARACTERIZATION OF THE LIMIT SOLUTION OF A SINGULAR PERTURBATION PROBLEM
O. Diekmann and D. Hilhorst Dec. 1979 25 p refs Submitted for publication
(MC-TW-195/79) Avail: NTIS HC A02/MF A01; Stichting Math. Centrum, Amsterdam FL 3

Two alternative methods are used to describe the limiting behavior, as sigma decreases, approaching the limit of 0, of the solution y sub sigma of the nonlinear two point boundary value problem sigma double prime + (g-y) y prime = 0, y(0) = 0, y(1), where g is a given function. The first method is based on the theory of maximal monotone operators, whereas the second one uses duality theory. Author

N81-14740# Stichting Mathematisch Centrum, Amsterdam (Netherlands). Dept. of Applied Mathematics.
VOLTERRA INTEGRAL EQUATIONS AND SEMIGROUPS OF OPERATORS
O. Diekmann Jan. 1980 38 p refs Submitted for publication
(MC-TW-197/80) Avail: NTIS HC A03/MF A01; Stichting Math. Centrum, Amsterdam FL 4

A semigroup approach for the study of Volterra integral equations of convolution type (renewal equations) is developed. The variation of constants formula, the adjoint semigroup, and the decomposition of the state space according to the spectrum of the infinitesimal generator are discussed. M.G.

N81-14741# National Physical Lab., Teddington (England). Div. of Numerical Analysis and Computer Science.
A GUIDE TO THE THEORY OF GEAR'S METHOD FOR THE NUMERICAL SOLUTION OF SYSTEMS OF STIFF ORDINARY DIFFERENTIAL EQUATIONS
A. R. Curtis Apr. 1980 16 p refs
(NPL-DNACS-29/80; ISSN-0143-7348) Avail: NTIS HC A02/MF A01

A preliminary analysis is given for the numerical solution of a single differential equation. The analysis is stated in terms of vectors and matrices. To assist in the understanding of the theory of constituent routines, an expository derivation of the formulas that form the basis of Gear's algorithm is presented. L.F.M.

N81-14742# Royal Inst. of Tech., Stockholm (Sweden). Dept. of Numerical Analysis and Computing Science.
A NOTE ON A DIFFERENTIAL SYSTEM CONSTRUCTED

BY H. O. KREISS
Joergen Sand 1980 8 p refs
(TRITA-NA-8004) Avail: NTIS HC A02/MF A01

The stability of the theta-method when applied to a certain initial value problem is compared to the stability of the analytic solution. Making different assumptions on the form of U(t), different results concerning the optimal value of theta are arrived at. M.G.

N81-14743# Stichting Mathematisch Centrum, Amsterdam (Netherlands). Dept. of Numerical Mathematics.
SUPERCONVERGENCE IN COLLOCATION AND IMPLICIT RUNGE-KUTTA METHODS FOR VOLTERRA-TYPE INTEGRAL EQUATIONS OF THE SECOND KIND
H. Brunner Feb. 1980 22 p refs Submitted for publication (Grant NRC-A-4805)
(MC-NW-80/80) Avail: NTIS HC A02/MF A01; Stichting Math. Centrum, Amsterdam FL 3

Collocation methods in certain piecewise polynomial spaces for Volterra and Abel integral equations of the second kind lead to implicit, semiimplicit, or explicit Runge-Kutta methods of Pouzet-type if the collocation equation is discretized by appropriate numerical quadrature. Results on global convergence and (local) superconvergence of such methods are discussed: it turns out that there is no complete analogy between these results and those for implicit Runge-Kutta methods for ordinary differential equations, and the local superconvergence property (at the knots) is lost entirely if the kernel of the equation is weakly singular. By means of an example arising in a modelling process in heart physiology, a certain superconvergence result for first kind Volterra equations is illustrated that can be used to deal with oscillatory components in the numerical approximation of the exact solution. Author

N81-14744# Stichting Mathematisch Centrum, Amsterdam (Netherlands). Dept. of Numerical Mathematics.
ON V SUB O STABILITY OF NUMERICAL METHODS FOR VOLTERRA INTEGRAL EQUATIONS OF THE SECOND KIND
H. Brunner (Fribourge Univ., Switzerland), S. P. Noersett (Technische Hogeschule, Trondheim, Norway), and P. H. M. Wolkenfelt May 1980 15 p refs
(MC-NW-84/80) Avail: NTIS HC A02/MF A01; Stichting Math. Centrum, Amsterdam FL 3

A class of extended, one-stage implicit Runge-Kutta methods of Bel'tyukov type which are V sub O-- stable are derived. It is shown that these methods are closely related to P-stable linear multistep methods for second-order initial value problems. M.G.

N81-14745# Stichting Mathematisch Centrum, Amsterdam (Netherlands). Dept. of Numerical Mathematics.
NUMERICAL SOLUTION OF TWO COUPLED NONLINEAR EQUATIONS RELATED TO THE LIMITS OF BUCHSTAB'S ITERATION SIEVE
Aug. 1980 18 p refs
(MC-NW-86/80) Avail: NTIS HC A02/MF A01; Stichting Math. Centrum, Amsterdam FL 3

Details are presented of numerical computations concerning the solution of two coupled nonlinear equations which arise in connection with the so-called Buchstab iteration sieve in number theory. The computations involve (among others) a function which is given as an infinite range integral over an integrand which has a weak singularity in on of the endpoints, and a function which is the solution of a differential-difference equation. Author

N81-14746# Stichting Mathematisch Centrum, Amsterdam (Netherlands). Dept. of Numerical Mathematics.
HYPERPERFECT NUMBERS WITH MORE THAN TWO DIFFERENT PRIME FACTORS
H. J. J. TeRiele Aug. 1980 8 p refs Submitted for publication
(MC-NW-87/80) Avail: NTIS HC A02/MF A01; Stichting Math. Centrum, Amsterdam FL 3

N-hyperperfect numbers are defined as positive integers m satisfying the equestion $m = 1 + n[\text{beta}(m) - 1]$ for some n epsilon IN. The question of whether all hyperperfect numbers have the form p alpha q, where p and q are prime numbers, p less than q and alpha epsilon IN is answered in the negative by constructing eleven hyperperfect numbers with three and one with four different prime factors. S.F.

N81-14747# Stichting Mathematisch Centrum, Amsterdam (Netherlands). Dept. of Applied Mathematics.
THE NUMERICAL COMPUTATION OF THE CONFLUENT HYPERGEOMETRIC FUNCTION U(a, b, z)
N. M. Temme Jun. 1980 29 p refs Submitted for publication
(MC-TW-202/80) Avail: NTIS HC A03/MF A01; Stichting Math. Centrum, Amsterdam FL 3

An algorithm is given for the computation of the confluent hypergeometric function U(a,b,z). For real values of a, b and z, z more than 0, ALGOL 60 procedures are given. The computations are based on a Miller algorithm and on asymptotic expansions. Author

N81-14748# Sheffield Univ. (England). Dept. of Control Engineering.
ON THE GEOMETRY OF MULTIVARIABLE ROOT-LOCI
D. H. Owens Sep. 1979 25 p refs Presented at 3d IMA Conf. on Control Theory, Sheffield, England Sep. 1980
(RR-118) Avail: NTIS HC A02/MF A01

The existence and structure of the integer order infinite zeros of a square, linear, time-invariant system S(A,B,C) are examined using geometric methods and annihilator techniques. Results are expressed in an iterative from relying, at each stage, on the validity of a generic assumption, and can be used, in principle, to evaluate the orders, asymptotic directions, and the limiting eigenvectors of each branch of the root locus. L.F.M.

N81-14749# Research Inst. of National Defence, Stockholm (Sweden).
RAPID CALCULATION OF SIN(X)
Staffan Wrigge, Arne Fransen, and Gustaf Borenius Mar. 1980 46 p refs
(FOA-C-10150-M8) Avail: NTIS HC A03/MF A01

Approximations of the form sin(pi x) and sin(2pi x) were investigated. The coefficients were calculated using the L sub 2 - norm. Several properties of the associated matrices were proved. Relations to the Jacobi polynomials G sub n (p,p,x) were established. Finally, the approximations were compared with other ways to calculate the sinus function. T.M.

N81-14750# Research Inst. of National Defence, Stockholm (Sweden).
A GENERAL METHOD OF APPROXIMATION PARTICULARLY IN L2
Staffan Wrigge, Arne Fransen, and Gustaf Borenius Aug. 1980 73 p refs
(FOA-C-10158-M8) Avail: NTIS HC A04/MF A01

Two families of functions and the approximation of the functions was studied. The associated matrices were analyzed using the theory of orthogonal polynomials, especially the Jacobi polynomials G sub n (p,q,x). An application of the method to the Jacobian elliptic function sn(x,k) is presented. T.M.

N81-14751# Research Inst. of National Defence, Stockholm (Sweden).
SOME NOTES ON THE GAMMA FUNCTION
Staffan Wrigge Oct. 1980 40 p refs
(FOA-C-10160-M8) Avail: NTIS HC A03/MF A01

An astonishing proof of the identity gamma(x) gamma(1-x) - pi/(sin(pi x)) was discovered during study of a Dirichlet integral. This result was used to obtain an even more astonishing proof of two classical identities. In the light of this proof the two identities are practically the same thing (i.e., 'Trivial' consequences of the identity gamma(x gamma(1-x) = pi/(sin(pi x)). These two classical identities are again considered in another using a technique involving Fourier transforms and probabilistic methods. Some integrals involving the gamma function are also evaluated using probabilistic methods and a slowly convergent series is considered. A.R.H.

N81-14752# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Brunswick (West Germany). Abt. Flugmechanik der Drehfluegelflugzeuge.
STABILIZATION OF THE NUMERICAL INTEGRATION OF

EQUATIONS OF MOTION Ph.D. Thesis - Tech. Univ., Brunswick
Wolfgang vonGruenhagen Nov. 1979 133 p refs In GERMAN; ENGLISH summary Report will also be announced as translation (ESA-TT-676)
(DFVLR-FB-79-41) Avail: NTIS HC A07/MF A01

It is demonstrated that for the numerical integration of equations of motion with constraints and integrals a modification of their formulation is possible so that they get a better error propagation behavior. This is not only valid for systems with outer constraints as holonomic and unholonomic constraints but also for systems with inner constraints in form of first integrals. This error propagation behavior is preserved when small perturbation terms are added. M.G.

N81-14753# Brown Univ., Providence, R. I. Lefschetz Center for Dynamical Systems.
STABILITY AND BIFURCATION IN A PARABOLIC EQUATION Interim Report
Jack K. Hale 22 Aug. 1980 20 p refs
(Contract DAAG27-79-C-0161; Grants AF-AFOSR-3092-76; NSF MCS-79-00774; AF Proj. 2304)
(AD-A091645; AFOSR-80-1148TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

Recent results on the stability of equilibrium solutions of a parabolic equation are given with indications of the proofs. Particular attention is devoted to dependence of the stability properties on the shape of the domain and the manner in which nonhomogeneous stable equilibria can occur through a bifurcation induced by varying the domain. GRA

N81-14754# Illinois Univ. at Urbana-Champaign, Urbana. Dept. of Computer Science.
NUMERICAL METHODS FOR INITIAL VALUE PROBLEMS Final Report, 1 Jun. 1975 - 30 Jun. 1980
Robert D. Skeel Jul. 1980 78 p refs
(Grant AF-AFOSR-2854-75; AF Proj. 2304)
(AD-A091502; AFOSR-80-0985TR) Avail: NTIS HC A05/MF A01 CSCL 12/1

Computational techniques were studied for the estimation of global discretization error in numerical solutions of both smooth and nonsmooth differential equations with an emphasis on the deferred correction technique. Of special interest were hyperbolic problems, for which mixed results were obtained. The implications of a stronger stability concept for Gaussian elimination were explored with respect to scaling, iterative refinement, and equilibration. Interesting equivalence and stability results were obtained for multistep methods for solving ordinary differential equations. GRA

N81-14755# Massachusetts Inst. of Tech., Cambridge. Lab. for Computer Science.
RESEARCH IN ALGEBRAIC MANIPULATION Final Report, 1979 - 1980
Joel Moses 1980 80 p refs
(Contract F49620-79-C-0200; AF Proj. 2304)
(AD-A091675; AFOSR-80-1118TR) Avail: NTIS HC A05/MF A01 CSCL 12/1

This report describes a new probabilistic algorithm for computing Greatest Divisors in polynominal time. The algorithm solves a basic problem inherent in all prior approaches that led to exponential space and time requirements. GRA

N81-14756# Oregon State Univ., Corvallis. Air Resources Center.
AN OBJECTIVE METHOD FOR DETERMINING THE GENERALIZED TRANSPORT TENSOR FOR TWO DIMENSIONAL EULERIAN MODELS Final Report
Edwin F. Danielsen and R. S. Hipskind 15 Aug. 1980 70 p refs
(Contract DOT-FA77WA-3992)
(AD-A091732; FAA-EE-80-32) Avail: NTIS HC A04/MF A01 CSCL 12/1

An objective method for deriving the components of a generalized transport tensor for a two dimensional model is presented. The method used representative meridional and vertical velocities and thermodynamic scalars at a uniform grid to reduce the problem to solving two flux equations for two unknowns. One unknown is the stream function, coefficient of an antisymmetric tensor, which corrects the Eulerian mean motions for Stokes drift. The other is a time constant, which converts the deviatory velocity tensor (Reynolds' stress tensor for temporal averaging) to a symmetric transport tensor. The complete asymmetric tensor is called a transport rather than a diffusion tensor because its divergence yields both advection and diffusion by the deviatory velocities. Advantages and disadvantages of Lagrangian and Eulerian averages are also discussed. GRA

N81-14757# Sandia Labs., Albuquerque, N. Mex. Numerical Mathematics Div.
THE WEIGHTED LINEAR LEAST SQUARES PROBLEM: AN INTERVAL ANALYSIS APPROACH TO RANK DETERMINATION
Thomas A. Manteuffel Aug. 1980 25 p refs Sponsored by DOE
(SAND-80-1260) Avail: NTIS HC A02/MF A01

This is an extension of the work in Mantauffel to the weighted linear least squares problem. Given the weighted linear least squares problem WAx is approximately Wb, where W is a diagonal weighting matrix, and bounds on the uncertainty in the elements of A, we define an interval matrix A(I) that contains all perturbations of A due to these uncertainties and say that the problem is rank deficient if any member of A(I) is rank deficient. It is shown that if WA - QR is the QR decomposition of WA, then Q and 1/R can be used to bound the rank of A(I). A modification of the Modified Gram Schmidt QR decomposition yields an algorithm that implements these results. The extra arithmetic is O(MN). Numerical results show the algorithm to be effective on problems in which the weights vary greatly in magnitude. Author

N81-14758# Sandia Labs., Albuquerque, N. Mex. Numerical Mathematics Div.
AN INTERVAL ANALYSIS APPROACH TO RANK DETERMINATION IN LINEAR LEAST SQUARES PROBLEMS
Thomas A. Manteuffel Jun. 1980 39 p refs Submitted for publication Sponsored by DOE
(SAND-80-0655) Avail: NTIS HC A03/MF A01

The linear least squares problem AX approximately B has a unique solution only if the matrix A has full column rank. An interval analysis approach is proposed that defines a set of matrices AI that contains all possible perturbations of A due to uncertainties and says that AI is rank deficient if any member of AI is rank deficient. A modification of the Q-R decomposition method of solution of the least squares problem allows a determination of the rank of AI, and a partial interval analysis of the solution vector X. This procedure requires the computation of R-1. Another modification is proposed which determines the rank of AI without computing R-1. The additional computational effort is O(N2) where N is the column dimensional of A. Author

N81-14759# Illinois Univ. at Urbana-Champaign, Urbana. Dept. of Computer Science.
AUTOMATIC DETECTION AND TREATMENT OF OSCILLATORY AND/OR STIFF ORDINARY DIFFERENTIAL EQUATIONS
C. W. Gear Jun. 1980 25 p refs Presented at Differential Equation Workshop, Bielefeld, West Germany, 21 Apr. 1980
(Contracts DE-AS02-76ER-02383; EY-76-S-02-2383)
(COO-2383-0068; CONF-8004115-1; UIUCDCS-R-80-1019; UILU-ENG-80-1721) Avail: NTIS HC A02/MF A01

The low cost, automatic detection of oscillatory behavior, the determination of its period, and methods for its subsequent efficient integration are addressed along with stiffness detection. In the first phase, the method for oscillatory problems discussed examines the output of any integrator to determine if the output is nearly periodic. At the point this answer is positive, the second phase is entered and an automatic, nonstiff, multirevolutionary method is invoked. This requires the occasional solution of a nearly periodic initial value problem over one period by a standard method and the redetermination of its period. Because the multirevolutionary method uses a very large step, the problem has a high probability of being stiff in this second phase. Hence, it is important to detect if stiffness is present so that an appropriate stiff, multirevolutionary method can be selected. DOE

N81-14760# Oak Ridge National Lab., Tenn. Computer Sciences Div.
[APPLICATION OF MATHEMATICS AND STATISTICS TO BIOMETRICS, MATERIALS SCIENCE, SAFETY, ENVIRONMENTAL SCIENCES, AND RELATED TOPICS] Progress Report, period ending 30 Jun. 1980
Donald A. Gardiner, P. M. DiZillo-Benoit, comp., W. E. Lawrence, comp., D. E. Shepherd, comp., and A. D. Solomon, comp. Sep. 1980 80 p refs
(Contract W-7405-eng-26)
(ORNL/CSD-61; PR-23) Avail: NTIS HC A05/MF A01

Research progress in biomietrics research, materials science applications, model evaluation, moving boundary problems, multivariate analysis, numerical linear algebra, risk analysis, and complementary areas is described. Problems in biology and health sciences, chemistry, engineering, energy, environmental sciences, material sciences, safeguards, sampling and surveys, health and safety research, and uranium resource evaluation are reported. DOE

N81-14761# Argonne National Lab., Ill. Applied Mathematics Div.
IMPROVING THE ACCURACY OF COMPUTED MATRIX EIGENVALUES Ph.D. Thesis
Jack J. Dongarra Aug. 1980 122 p refs
(Contract W-31-109-eng-38)
(ANL-80-84) Avail: NTIS HC A06/MF A01

A computational method is described for improving the accuracy of a given eigenvalue and its associated eigenvector, arrived at through a computation in a lower precision. The method described increases the accuracy of the pair and do so at a relatively low cost. The technique used is similar to iterative refinement for the solution of a linear system; through the factorization from the low-precision computation, an iterative algorithm is applied to increase the accuracy of the eigenpair. Extended precision arithmetic is used at critical points in the algorithm. The iterative algorithm requires O(n squared) operations for each iteration. DOE

65 STATISTICS AND PROBABILITY

Includes data sampling and smoothing; Monte Carlo method; and stochastic processes.

N81-14762# Stichting Mathematisch Centrum, Amsterdam (Netherlands). Dept. of Applied Mathematics.
CLINES IN A DISCRETE TIME MODEL IN POPULATION GENETICS
O. Diekmann Sep. 1979 12 p refs Submitted for publication
(MC-TW-193/79) Avail: NTIS HC A02/MF A01; Stichting Math. Centrum, Amsterdam FL 3

Motivated by a model from population genetics, nonlinear integro-difference equation is studied. It is shown that certain conditions guarantee the existence, the uniqueness, and the global asymptotic stability of a monotone increasing equilibrium solution (a so-called cline). Author

N81-14763# Stichting Mathematisch Centrum, Amsterdam (Netherlands). Dept. of Mathematical Statistics.
BRANCHING PROCESSES WITH CONTINUOUS STATE SPACE ALLOWING IMMIGRATION
P. J. M. Kallenberg Feb. 1980 16 p refs Submitted for publication
(MC-SW-67/80) Avail: NTIS HC A02/MF A01; Stichting Math. Centrum, Amsterdam FL 3

Asymptotic properties of branching processes with continuous state space allowing immigration are studied; in particular results are derived for the class of processes which do not occur if only processes for which the state space is integer valued are considered. The methods used are very similar to the ones used to obtain results for Galton Watson processes. M.G.

N81-14764# Stichting Mathematisch Centrum, Amsterdam (Netherlands). Dept. of Mathematical Statistics.
BAHADUR EFFICIENCY AND SMALL-SAMPLE EFFICIENCY: A NUMERICAL STUDY
P. Groeneboom and J. Oosterhoff Mar. 1980 33 p refs
(MC-SW-68/80) Avail: NTIS HC A03/MF A01; Stichting Math. Centrum, Amsterdam FL 4

In a number of examples the accuracy of the approximation of small sample efficiencies by asymptotic efficiencies is investigated numerically, paying special attention to Bahadur asymptotic efficiencies. It is argued that the asymptotic (relative) efficiencies can be interpreted as limits of a natural small sample (relative) efficiency concept. The more recently introduced (asymptotic) deficiencies are also considered. M.G.

N81-14765# Illinois Univ. at Urbana-Champaign, Urbana. Computer Based Education Research Lab.
EXTRACTING UNIDIMENSIONAL CHAINS FROM MULTIDIMENSIONAL DATASETS: A GRAPH THEORY APPROACH Research Report, 21 Aug. - 20 Nov. 1979
Yoneo Yamamoto and Steven L. Wise Feb. 1980 38 p *refs*
(Contract N00014-79-C-0752; NR Proj. 154-445)
(AD-A091693; CERL-E-14; RR-80-2) Avail: NTIS HC A03/MF A01 CSCL 12/1

Reynolds (1976) described an order-analysis procedure for extracting unidimensional chains of items (or persons) from multidimensional datasets. It is an exhaustive method, using one of Cliff's consistency indices to extract all possible chains which maintain a given level of consistency. A practical problem with this method is that the number of computer calculations needed for chain extraction can become very high. This paper outlines a procedure which uses graph theory to extract nonredundant chains efficiently, rather than exhaustively generating all chains, as with Reynolds' procedure. It also uses chain consistency as a criterion for chain membership. The dominance matrix can be reconsidered as a labelled digraph. From this digraph, all subgroups with perfect consistency are generated, and these in turn are used as starting points in the chain extraction process. The original dominance digraph is then reduced until the chain is found from each subgraph. This graph-theoretic algorithm may be carried out using a series of matrix manipulations performed on the dominance matrix. GRA

N81-14766# Union Coll., Schenectady, N.Y. Inst. of Administration and Management.
GENERAL RESULTS, TIME SERIES IN M DIMENSIONS
Leo A. Aroian and Josef Schmre 25 Sep. 1980 8 p refs
Presented at the 11th Ann. Pittsburgh Conf. on Modeling and Simulation, 1-2 May 1980
(Contract N00014-77-C-0438)
(AD-A091578; AES-8006) Avail: NTIS HC A02/MF A01 CSCL 12/1

General results in the theory of time series in m dimensions are obtained, thus providing a broad view applicable to the various models. The interrelationships among the various types of moving average models, MA, and autoregressive models, AR, and the general ARMA autoregressive moving average models are stressed. GRA

N81-14767# Naval Underwater Systems Center, New London, Conn.
APPROXIMATIONS TO THE CUMULATIVE DISTRIBUTION FUNCTION OF THE MAGNITUDE-SQUARED COHERENCE ESTIMATE
Albert H. Nuttall 25 Aug. 1980 46 p refs
(ZR0000101)
(AD-A091539; NUSC-TR-6327) Avail: NTIS HC A03/MF A01 CSCL 12/1

An approximate method of evaluating the cumulative distribution function of the magnitude-squared coherence estimate is provided. The approximation is good when the number of averaged pieces in the coherence estimate is greater than approximately 16, when the true coherence values are in the range (.01, .99), and for cumulative probabilities in the range (.01, .99). A simple formula for obtaining confidence limits in the same range of parameters is also presented. An extension to a more accurate approximation is also given; it involves the inversion of a nonlinearity that requires computer aid. GRA

N81-14768# Carnegie-Mellon Univ., Pittsburgh, Pa. Management Sciences Research Group.

PROFIT MAXIMIZATION MODELS FOR EXPONENTIAL DECAY PROCESSES

S. P. Sethi (Toronto Univ., Canada), G. L. Thompson, and V. Udayabhanu Aug. 1980 31 p refs

(Contract N00014-75-C-0621; NR Proj. 047-048)

(AD-A091522; MSRR-464; WP-9-80-81) Avail: NTIS HC A03/MF A01 CSCL 12/1

A number of real world processes can be modelled as exponential decay processes. Examples are machine replacement, oil well extraction, advertising goodwill, repair and cleaning activities, etc. In this paper we analyze a series of discounted or undiscounted, deterministic or stochastic exponential decay model. We characterize finite and infinite horizon optimal solutions for each model. We show that the solution can be characterized for the oil drillers problem in the following way: once a well of sufficient capacity is drilled, oil is pumped from it until the oil remaining decreases to a fixed cut-off level; then the well is abandoned, and a new well is drilled. The resulting process when repeated over time appears to be the same as an oil source which produces oil revenue continuously at the fixed cut-off level. In other words, the excess revenue received from an oil well when its capacity is greater than the cutoff level is just sufficient to pay for drilling costs for a new well. GRA

N81-14769# Southern Methodist Univ., Dallas, Tex. Dept. of Statistics.

MINIMUM DISTANCE ESTIMATION AND COMPONENTS OF GOODNESS OF FIT STATISTICS

William C. Parr and William R. Schucany Sep. 1980 34 p refs Prepared in cooperation with Texas A and M Univ., College Station

(Contract N00014-75-C-0439; NR Proj. 042-280)

(AD-A091514; TR-139) Avail: NTIS HC A03/MF A01 CSCL 12/1

The relationship of minimum distance (MD) estimation to other methods of estimation is considered. M-estimation is viewed as a special case, with interesting interpretations in terms of the defining-function as related to components of goodness-of-fit statistics and modified Fourier approximations to the efficient score. Applications to the composite and simple goodness-of-fit problems are considered. GRA

N81-14770# Southern Methodist Univ., Dallas, Tex. Dept. of Statistics.

BIASED REGRESSION: A TEN YEAR PERSPECTIVE

Richard F. Gunst 1980 43 p refs

(Contract F49620-79-C-0106)

(AD-A091551) Avail: NTIS HC A03/MF A01 CSCL 12/1

Biased estimation in regression has experienced a tremendous growth in popularity since Hoerl and Kennard's formalization of ridge regression. Along with the interest in biased regression, many research efforts over the last ten years have extended both the theory and application of these methodologies. So too, criticisms have arisen which focus on the incompleteness of the theoretical results and on exaggerated claims about the merits of biased estimators. Rather than attempting to arbitrate these opposing views, this article discusses biased estimation with special emphasis on its ultimate justification: application to real problems. Advantages and disadvantages of three biased estimators (principal component, latent root, and ridge regression estimators) are discussed and illustrated through a comprehensive analysis of a data set on automobile emissions. From the discussion and analysis it is hoped that a more balanced perspective on the application of biased estimation will be fostered. GRA

N81-14771# Texas Univ. at Austin. Dept. of Electrical Engineering.

ON THE PERFORMANCE OF A MODIFIED SIGN DETECTOR FOR M-DEPENDENT DATA Interim Report

Don R. Halverson and Gary L. Wise Oct. 1979 10 p refs Presented at the 17th Ann. Allerton Conf. on Commun., Control and Computing, Monticello, Ill., 10-12 Oct. 1979

(Contract F49620-77-C-0101; Grant AF-AFOSR-3062-76; AF Proj. 2304)

(AD-A091570; AFOSR-80-1021TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

A nonparametric detection scheme, the modified sign detector, may be applied to the discrete time detection of a constant signal in additive m-dependent noise. It is shown how the optimal block size for this detector may be selected for two fidelity criteria, one based on a finite number of samples and the other on the asymptotic limit. These results may then be used to exhibit examples of cases where a small block length is indicated by the finite sample criterion, whereas a large block length is indicated by the asymptotic criterion. GRA

N81-14772# Union Coll., Schenectady, N.Y. Inst. of Administration and Management.

SOME SIMPLE EXAMPLES OF TIME SERIES IN m DIMENSIONS: AN INTRODUCTION

Leo A. Aroian and Vidya Taneja 25 Sep. 1980 14 p refs Presented at 11th Ann. Pittsburgh Conf. on Modeling and Simulation, Pittsburgh, May, 1980 Prepared in cooperation with Western Illinois Univ.

(Contract N00014-77-C-0438)

(AD-A091733; AES-8005) Avail: NTIS HC A02/MF A01 CSCL 12/1

Some simple theoretical examples of time series in m dimensions, their main properties, estimation, and forecasting are given. These are generalizations of the usual time series to events in both time and space. How these models may be simulated is explained. One practical example of flooding on the Mohawk River is given. Included are new results in forecasting: the regions for permissible values of the autocorrelation and cross correlations; and methods for obtaining these correlations. GRA

N81-14773# Union Coll., Schenectady, N.Y. Inst. of Administration and Management.

TIME SERIES IN m DIMENSIONS: SPATIAL MODELS

Leo A. Aroian and Omer Gebizlioglu 25 Sep. 1980 10 p refs Presented at the Ann. Meeting of the Am. Statist. Assoc., Houston, Tex., Aug. 1980

(Contract N00014-77-C-0438)

(AD-A091734; AES-8007) Avail: NTIS HC A02/MF A01 CSCL 12/1

The general theory of stationary spatial models is developed: namely MA, moving average; AR, autoregressive; and ARMA, autoregressive moving average processes. As compared to the time series in m dimensions, spatial models may be one-sided, two-sided, or mixed. Free use is made of the previous results of Aroian and his associates in time series in m dimensions. The main theoretical properties of the models in the univariate case are established. The multivariate case is even more important than the univariate. Estimation by minimum variance and simulation of the models are included. GRA

N81-14774# Purdue Univ., Lafayette, Ind. School of Industrial Engineering.

RANDOM VARIATE GENERATION: A SURVEY

Bruce W. Schmeiser Jun. 1980 28 p refs Presented at the 1980 Winter Simulation Conf., Orlando, Fla.

(Contract N00014-79-C-0832; NR Proj. 277-236)

(AD-A091343; RM-80-06) Avail: NTIS HC A03/MF A01 CSCL 12/1

The state of the art of generating random variates on a digital computer is surveyed. General concepts are presented, followed by criteria for comparing algorithms. The literature is surveyed for continuous univariate, discrete univariate, continuous multivariate, and discrete multivariate distributions, as well as point processes, time series, order statistics and geometrically inspired problems. An extensive list of references is provided. GRA

N81-14775# Chicago Univ., Ill. Dept. of Statistics.

METHODS IN PROBABILITY AND STATISTICAL INFERENCE Final Report, 15 Jun. 1975 - 30 Jun. 1979

David L. Wallace and Michael D. Perlman Jun. 1980 38 p refs

(Contracts DE-AS02-76ER-02751; EY-76-S-02-2751)

(COO-2751-4) Avail: NTIS HC A03/MF A01

Nine research projects are briefly described on the following subjects: statistical computing and approximation techniques in statistics; numerical computation of first passage distributions; probabilities of large deviations; combining independent tests of

significance; small-sample efficiencies of tests and estimates; improved procedures for simultaneous estimation and testing of many correlations; statistical computing and improved regression methods; comparison of several populations; and unbiasedness in multivariate statistics. A description of the statistical consultation activities of the Department that are of interest to DOE, in particular, the scientific interactions between the Department and the scientists at Argonne National Laboratories, is given. A list of publications issued during the term of the contract is included. DOE

66 SYSTEMS ANALYSIS

Includes mathematical modeling; network analysis; and operations research.

N81-14776# Sheffield Univ. (England). Dept. of Control Engineering.
ANALYSIS OF ESTIMATION ERRORS IN THE IDENTIFICATION OF NONLINEAR SYSTEMS
S. Y. Fakhouri (Bradford Univ., England), S. A. Billings, and C. N. Wormold (Bradford Univ., England) Jun. 1980 39 p refs (RR-115) Avail: NTIS HC A03/MF A01

Estimation errors introduced in the identification of nonlinear systems are analysed. The influence of record length, mean level, power and bandwidth of the input excitation, the effects of input and output noise and errors introduced by the decomposition techniques are investigated. Experimental design and input selection are discussed and the results are illustrated by simulated examples. Author

N81-14777# Stichting Mathematisch Centrum, Amsterdam (Netherlands). Dept. of Operations Research.
LINEAR PROGRAMMING AND UNDISCOUNTED STOCHASTIC GAMES IN WHICH ONE PLAYER CONTROLS TRANSITIONS
O. J. Vrieze Apr. 1980 16 p refs Submitted for publication (MC-BW-122/80) Avail: NTIS HC A02/MF A01; Stichting Math. Centrum, Amsterdam FL 3

Noncooperative two person zero sum undiscounted stochastic games with finite state and action spaces are considered. It is assumed that one player governs the transition rules. A linear programming algorithm is given: it is shown that an optimal solution to this program corresponds to the value of the game and to optimal stationary strategies for both players. Moreover, this linear programming formulation results in an existence proof of the value and of optimal stationary strategies for both players. Author

N81-14778# Stichting Mathematisch Centrum, Amsterdam (Netherlands). Dept. of Operations Research.
DUALITY AND THE NONLINEAR ROUNDTRIP ALPHA CENTER AND COVERING PROBLEMS ON A TREE
A. Kolen Apr. 1980 22 p refs Submitted for publication (MC-BW-123/80) Avail: NTIS HC A02/MF A01; Stichting Math. Centrum, Amsterdam FL 3

The round trip I center problem is to locate I new facilities with respect to a finite number of pairs of existing facilities on a tree so as to minimize the maximum round trip cost. The round trip cost of serving a pair of existing facilities is a nonlinear function of the round trip distance from the nearest new facility. The round trip covering problem is to find the minimum number of new facilities such that each round trip cost is no more than a given constant. For both problems, a dual problem is defined and a strong duality result is proved. Algorithms to solve both round trip location problems in polynomial time are given. Author

N81-14779# Sheffield Univ. (England).
IDENTIFICATION OF NONLINEAR SYSTEMS USING PARAMETER ESTIMATION TECHNIQUES
S. A. Billings and I. J. Leontaritis Sep. 1980 6 p refs (RR-117) Avail: NTIS HC A02/MF A01

The identification of nonlinear systems using parameter estimation methods based on input/output difference equation models is considered. A general representation of a wide class of nonlinear systems is derived by considering an observability condition. The Hammuerstein, Wiener, bilinear and other well known models are shown to be special cases of the nonlinear model. The effects of internal noise are investigated and the estimation of the coefficients using linear estimation algorithms is shown to yield biased estimates. A modified extended least squares algorithm is presented and structure detection methods and model validity checks are briefly discussed. Author

N81-14780# Stichting Mathematisch Centrum, Amsterdam (Netherlands). Dept. of Operations Research.
HIERARCHICAL DISTRIBUTION MODELING WITH ROUTING COSTS
A. Federgruen (Columbia Univ., N.Y.) and B. J. Lageweg Feb. 1980 60 p refs Submitted for publication (MC-BW-117/80) Avail: NTIS HC A04/MF A01; Stichting Math. Centrum, Amsterdam FL 7

Modeling devices for herarchical distribution systems, performing the distribution of commodities producer to customer through, a number of levels, are described. For such a system location issues (number, location, and capacity of facilities on each level), allocation issues (the allocation of delivery points to supply points on the next higher level), and in particular, channel choices (the level from which each delivery point should be served) are investigated. Moreover the model assumes that several deliveries can be combined into a single route. This feature prohibits a simple allocation of distribution costs to individual demand points and necessitates explicit estimates of the routing costs into the model to be incorporated. Finally a description is given of an industrial project and some computational experience with respect to this project is quoted. M.G.

N81-14781# Stichting Mathematisch Centrum, Amsterdam (Netherlands). Dept. of Operations Research.
ANALYTICAL EVALUATION OF HIERARCHICAL PLANNING SYSTEMS
M. A. H. Dempster (Oxford Univ.), M. L. Fisher (Pennsylvania Univ. Philadelphia), L. Jansen, B. J. Lageweg, J. K. Lenstra, and A. H. G. RinnooyKan (Erasmus Univ.) Mar. 1980 15 p refs (Grant NSF ENG-78-26500)
(MC-BW-118/80) Avail: NTIS HC A02/MF A01; Stichting Math. Centrum Amsterdam FL 3

The concept of hierarchical planning is reviewed and some examples are cited. A method for analytic evaluation of a hierarchical planning system is described. It is shown that multi-level decision problems can be nicely modeled as stochastic programs. Then any hierarchical planning system can be measured against the yardstick of optimality in this stochastic program. This approach is demonstrated on a hierarchical system that can be shown to be asymptotically optimal for a job shop design/scheduling problem. M.G.

67 THEORETICAL MATHEMATICS

Includes topology and number theory.

N81-14782# Chalmers Univ. of Technology, Goteborg (Sweden). Dept. of Mathematics.
A TIME-DISCRETE BOLTZMANN EQUATION
Leif Arkeryd 1980 9 p refs Prepared in cooperation with Goeteborg Univ., Sweden
(CTH-Math-1980-1) Avail: NTIS HC A02/MF A01

The well posedness of a time discrete, space inhomogeneous Boltzman equation is proved, some remarks on possible extensions and open problems are given. The proofs are based on monotone approximation. Some observations about the iteration schemes are introduced to handle the existence and continous dependence on the initial values. M.G.

N81-14783# Royal Inst. of Tech., Stockholm (Sweden). Dept. of Numerical Analysis and Computing Science.
A NOTE ON KRONECKER PRODUCTS AND RELATED NORMS
Germund Dahlquist 1980 7 p refs
(TRITA-NA-8001) Avail: NTIS HC A02/MF A01

A type of norms that is useful in the stability theory of

multistep methods is described in terms of Kronecker products. A single multiplicativity property is derived which may facilitate the handling of such norms. An analogous additive result is obtained for infinitesimal perturbations of the unit matrix. The latter yields an estimate of the growth of the solutions of equations of the type $dX/dt = AX+XB(t)$, where the matrices A, B may depend on t. Author

N81-14784# Southern Methodist Univ., Dallas, Tex. Dept. of Statistics.
THE DETERMINATION OF SEASONAL ARMA MODELS
Michael Morton Oct. 1980 35 p refs
(Contract N00014-75-C-0439; NR Proj. 042-280)
(AD-A091516; TR-141) Avail: NTIS HC A03/MF A01 CSCL 12/1

Gray, Kelley, and McIntire (1978) have described a method for determining the order of an ARMA process and for identifying roots of the characteristic equation on or near the unit circle. In this paper, we will demonstrate how that approach can be utilized in modeling seasonal data. GRA

N81-14785# Southern Methodist Univ., Dallas, Tex. Dept. of Statistics.
MODELING SEASONAL ARMA PROCESSES
Jeffrey D. Hart and H. L. Gray Oct. 1980 31 p refs
(Contract N00014-75-C-0439; NR Proj. 042-280)
(AD-A091515; TR-140) Avail: NTIS HC A03/MF A01 CSCL 12/1

Gray, Kelley, and McIntire (1978) have introduced a method, based on arrays of numbers called R and S arrays, for identifying p and q in an ARMA (p,q) process. In addition, they have illustrated how the same method is useful in detecting nonstationary factors in an observed process, and in suggesting an appropriate transformation to stationarity. In the present paper special attention is given to the problem of modeling seasonal ARMA processes using the S array method. A general definition is given for a seasonal process, and the procedure for identifying and modeling such processes is discussed in detail. Additionally, an interesting theorem characterizing the S arrays (based upon the sample autocorrelation) of seasonal processes is stated and a proof indicated. Finally, a data set (the international airline data) which exhibits the properties of a seasonal process is analyzed using the method discussed, and two models for the data are proposed. GRA

N81-14786# California Univ., Santa Barbara. Inst. for Algebra and Combinatorics.
INEQUALITIES CONNECTING EIGENVALUES AND NON-PRINCIPAL SUBDETERMINANTS Interim Report
Marvin Marcus and Ivan Filippenko 1980 16 p refs
(Contract F49620-78-C-0030; AF Proj. 2304)
(AD-A091503; AFOSR-80-1022TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

The nonprincipal subdeterminants of a normal matrix satisfy certain quadratic identities. In this paper, these identities are used to obtain upper bounds on such subdeterminants in terms of elementary symmetric functions of the moduli of the eigenvalues. The same analysis yields lower bounds on the spread of a normal matrix and on the Hilbert norm of an arbitrary matrix. GRA

70 PHYSICS (GENERAL)

For geophysics see *46 Geophysics*. For astrophysics see *90 Astrophysics*. For solar physics see *92 Solar physics*.

No abstracts in this category.

71 ACOUSTICS

Includes sound generation, transmission and attenuation.

For noise pollution see *45 Environment Pollution*.

N81-14787 Institut Franco-Allemand de Recherches, St. Louis (France).
ANALYSIS METHOD OF THE SPATIO-TEMPORAL STRUCTURE OF AN ACOUSTIC FIELD IN THE AIR WITH THE AID OF ITS OPTICAL FOURIER TRANSFORM
P. Smigielski, J. Haertig, G. Waton, J. Schwab, and B. Caulet 21 Nov. 1979 11 p refs Presented at 2d European Congr. on Opt. Appl. to Metrology, (OPIEM), Strasburg, Nov. 1979
(ISL-CO-219/79) Avail: NTIS HC A02/MF A01

An opto-electronic method is proposed which permits the study of ordered structures in optically transparent mediums and measurement of their phase speed. The validity of the process associating the optical Fourier transformation and interferometry is verified experimentally in applying it to the study of different modes propagating in an acoustic waveguide. Author

N81-14788*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
ASSESSMENT OF GROUND EFFECTS ON THE PROPAGATION OF AIRCRAFT NOISE: THE T-38A FLIGHT EXPERIMENT
William L. Willshire, Jr. Dec. 1980 128 p refs
(NASA-TP-1747; L-13765) Avail: NTIS HC A07/MF A01 CSCL 20A

A flight experiment was conducted to investigate air to ground propagation of sound at gazing angles of incidence. A turbojet powered ariplane was flown at altitudes ranging from 10 to 160 m over a 20-microphone array positioned over grass and concrete. The dependence of ground effects on frequency, incidence angle, and slant range was determined using two analysis methods. In one method, a microphone close to the flight path is compared to down range microphones. In the other method, comparisons are made between two microphones which were equidistant from the flight path but positioned over the two surfaces. In both methods, source directivity angle was the criterion by which portions of the microphone signals were compared. The ground effects were largest in the frequency range of 200 to 400 Hz and were found to be dependent on incidence angle and slant range. Ground effects measured for angles of incidence greater than 10 deg to 15 deg were near zero. Measured attenuation increased with increasing slant range for slant ranges less than 750 m. Theoretical predictions were found to be in good agreement with the major details of the measured results. Author

N81-14789*# Georgia Inst. of Tech., Atlanta. School of Aerospace Engineering.
PREDICTION OF SOUND RADIATED FROM DIFFERENT PRACTICAL JET ENGINE INLETS Semiannual Status Report, 2 Jun. - 30 Nov. 1980
B. T. Zinn and W. L. Meyer 1980 41 p refs
(Grant NAG3-67; Contract F49620-77-C-0066)
(NASA-CR-163824) Avail: NTIS HC A03/MF A01 CSCL 20A

Existing computer codes for calculating the far field radiation patterns surrounding various practical jet engine inlet configurations under different excitation conditions were upgraded. The computer codes were refined and expanded so that they are now more efficient computationally by a factor of about three and they are now capable of producing accurate results up to nondimensional wave numbers of twenty. Computer programs were also developed to help generate accurate geometrical representations of the inlets to be investigated. This data is required as input for the computer programs which calculate the sound fields. This new geometry generating computer program considerably reduces the time required to generate the input data which was one of the most time consuming steps in the process. The results of sample runs using the NASA-Lewis QCSEE inlet are presented and comparison of run times and accuracy are made between the old and upgraded computer codes. The overall accuracy of the computations is determined by comparison

of the results of the computations with simple source solutions. A.R.H.

N81-14790*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
NOISE PREDICTION FOR JETSTAR PROP-FAN TEST
F. Farassat, R. M. Martin, and G. C. Greene Dec. 1980 292 p refs
(NASA-TM-81916) Avail: NTIS HC A13/MF A01 CSCL 20A

The acoustic calculations reported in this memorandum are for two model prop-fan designs (SR-2 and SR-3 blades) scheduled for test on top of Jetstar aircraft. The predicted acoustic pressure signatures and spectra for selected microphone positions on the fuselage and operating conditions are presented. A detailed presentation of the input data, the acoustic results, and the corrections for microphone fuselage reflection are included. The general trend observed in these calculations is that the acoustically optimized model (using SR-3 blades) is substantially quieter than the model with SR-2 blades. This latter design has conventional straight blades. E.D.K.

N81-14791# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Berlin (West Germany). Inst. fuer Experimentelle Stroemungsmechanik.
SOUND SOURCE LOCATION MEASUREMENTS ON HIGH SPEED TRAINS
Dietrich W. Bechert, Walter F. King, Friedrich R. Grosche, Horst Stiewitt, and Alan Martin (TOLTEC Data Ltd.) Jul. 1979 106 p refs In GERMAN; ENGLISH summary
(Contract BMFT-TV-77230)
(DFVLR-Mitt-79-15) Avail: NTIS HC A06/MF A01; DFVLR, Cologne DM 16,30

Measurements with two different directional microphone systems were made for the purpose of locating and identifying radiated noise sources on a high speed electric train travelling at speeds between 160 and 250 km/h. An acoustic mirror with 7 microphones positioned in the focal plane was used to measure higher frequency noise, while a linear array of 14 microphones was used for lower frequencies. Data recorded with the array were processed so as to allow the main lobe to either (1) focus dead ahead, or (2) be electronically slewed to track moving sound sources. Both wheel/rail and aerodynamic sound sources were investigated with the mirror and the array. The results of these measurements demonstrate the versatility and usefulness of directional microphone systems for locating and analyzing noise sources on moving vehicles. Author

N81-14792# National Physical Lab., Teddington (England). Acoustics Unit.
THE RATING OF HELICOPTER NOISE: DEVELOPMENT OF A PROPOSED IMPULSE CORRECTION
B. F. Berry, H. C. Fuller, A. J. John, and D. W. Robinson Dec. 1979 45 p refs
(NPL-AC-93; ISSN-0143-7143) Avail: NTIS HC A03/MF A01

Efforts to the scale of effective perceived noise level (EPNL) to account for the subjective effects of impulsive helicopter noise are reported. Psychoacoustical studies of the annoyance of recorded and simulated helicopter noises are described and an objective descriptor of impulsiveness is developed. This descriptor forms the basis of a draft standard for an impulse correction to EPNL. M.G.

N81-14793# Rolls-Royce Ltd., Derby (England).
EXHAUST NOISE IN FLIGHT: THE ROLE OF ACOUSTIC INSTALLATION EFFECTS
I. S. Southern Apr. 1980 14 p refs
(PNR-90029) Avail: NTIS HC A02/MF A01

The acoustic installation effect on engine exhaust noise due to the presence of a wing or high tailplane is discussed for both the static and flight cases. A simple theoretical model for reflection and edge diffraction using ray theory is introduced and compared with experimental results. The model is used to predict full scale installation effects where, due to the low directivity of engine noise, reflection is dominant and the effect generally less than 3 dB. This suggests that the so called static to flight anomaly cannot be explained in terms of acoustic installation effects. Some alternative possibilities are reviewed. Author

N81-14794# Rolls-Royce Ltd., Derby (England).
RAY THEORY TO PREDICT THE PROPAGATION OF BROADBAND FAN NOISE
A. J. Kempton 1980 9 p refs
(PNR-90030) Avail: NTIS HC A02/MF A01

The feasibility of using a ray theory approach to predict the propagation, attenuation and radiation of high frequency engine intake noise is illustrated. Good agreement is demonstrated between ray theory and mode theory predictions for the broadband noise radiated in the absence of flow from short cylindrical ducts and from ducts of slowly varying cross sectional area. The two prediction schemes are also in broad agreement concerning the variation with wall impedance of the SPL insertion loss. Several important conclusions are drawn concerning the radiation of broadband noise from cylindrical inlets, from inlets of varying cross sectional area, and from scarfed inlets (for which no modal solution is available). A.R.H.

N81-14795# Rolls-Royce Ltd., Derby (England).
THE MEASUREMENT OF AERO GAS TURBINE NOISE
L. R. Bentley 29 Jan. 1980 44 p refs
(PNR-90032) Avail: NTIS HC A03/MF A01

Equipment used in noise certification tests for gas turbine aircraft engines includes: (1) a microphone system, calibrated amplifier and tape recorder; (2) a means of relating aircraft position and the noise; and (3) an apparatus for determining the temperature and humidity conditions in the propagation space for the calculation of atmospheric attenuation. Techniques for obtaining flyover and static test bed measurements are examined and assessed. Future developments are considered with emphasis on the acquisition of digital data. A.R.H.

N81-14796# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Goettingen (West Germany). Inst. fuer Experimentelle Stroemungsmechanik.
NOISE AND NOISE ABATEMENT IN FANS AND BLOWERS: A REVIEW
Wolfgang Neise Mar. 1980 148 p refs In GERMAN; ENGLISH summary
(DFVLR-FB-80-16) Avail: NTIS HC A07/MF A01; DFVLR, Cologne DM 22,50

Noise generation and its reduction industrial fans (ventilators) is addressed. A review is given of the fan types commonly in use and their practical applications, the mechanisms of the aerodynamic noise generation in fans, theoretical and empirical prediction methods for fan noise, acoustic similarity laws, and noise reduction methods by means of the fan construction and fan operation. Measurement procedures are discussed with respect to the noise radiated from different parts of a fan, e.g., from the fan inlet or outlet, from the fan casing, from the fan as a whole, and to the noise radiated into ducts connected to the fan. Finally, considerations are made, for which classes of fans noise standards can be defined to characterize the noise emission of the various fan types. M.G.

N81-14797# Pennsylvania State Univ., University Park.
ULTRASONIC ATTENUATION IN NORMAL AND SUPERCONDUCTING INDIUM Ph.D. Thesis Technical Memorandum for period ending Aug. 1980
Michael P. Conley 22 May 1980 106 p refs
(Contract N00024-79-C-6043)
(AD-A091605; ARL/PSU/TM-80-126) Avail: NTIS HC A06/MF A01 CSCL 20/1

The dependence of ultrasonic attenuation on temperature, sonic frequency, propagation direction, and superconducting state has been measured in indium single crystals using low-amplitude longitudinal waves. These measurements and the experimental apparatus with which they have been obtained are described. These data indicate that, in addition to the usual electronic attenuation described quantitatively by the BCS theory of superconductivity (Bardeen et al., Phys. Rev. 108, 1175), there is an additional source of attenuation. This secondary attenuation is generally attributed to the interaction of sound waves and crystal dislocations within the specimen, a process which has been described most thoroughly by Granato and Lucke (J. Appl.

Phys. 27, 583). A comparison of the measured dislocation attenuations with those predicted by the theory of Granato and Lucke is given. This theory is shown to be inapplicable to the situation of this experiment, i.e., to indium at low temperatures. Earlier works in which similar data appear to substantiate the Granato and Lucke theory of dislocation attenuation are shown to be insufficient tests of that theory. GRA

N81-14798# George Washington Univ., Washington, D.C. Dept. of Physics.

MEASUREMENT OF THE HARMONIC CONTENT ACROSS A BOUNDED ULTRASONIC BEAM Ph.D. Thesis

Douglas D. McLennan and Tran D. K. Ngoc Oct. 1980 53 p refs

(Contract N00014-78-C-0584)

(AD-A091646; GUUS-108003-TR-3) Avail: NTIS HC A04/MF A01 CSCL 20/1

An experimental technique was designed to map the fundamental and harmonic sound amplitudes across a bounded beam for different distances from the source. The measured profiles reflect the influences of competing mechanisms such as nonlinearity, dissipation, and diffraction in a liquid medium. GRA

N81-14799# Bolt, Beranek, and Newman, Inc., Cambridge, Mass.

A PRELIMINARY ANALYSIS OF THE AUDIBLE NOISE OF CONSTANT SPEED, HORIZONTAL AXIS WIND TURBINE GENERATORS

D. N. Keast and R. C. Potter Jul. 1980 72 p refs

(Contract DE-AP01-79EV-10014)

(DOE/EV-0089) Avail: NTIS HC A04/MF A01

A preliminary analytical procedure developed for calculating certain aerodynamic sound levels produced by large, horizontal axis wind turbine generators (WTG's) such as the DOE/NASA Mods- O, OA, 1, and 22. It postulates a noise component due to the (constant) rotation of the blades of the WTG, plus a wake-noise component that increases with the square of the power produced by the WTG. Sounds from machinery, and low frequency impulsive sounds produced by blade interaction with the wake of the support tower are not considered. In order to evaluate the acceptability of the sounds from WTG's, three noise limits were selected: the noise regulations of the states of Minnesota and Illinois and a U.S. EPA guideline for avoiding noise complaints from the public. The impact of WTG noise was evaluated against these three limits by computing acceptability distances. It is concluded that the infrasonic component of WTG sound, occurring at the blade passage rate, is at a very low level compared with existing limits of acceptability for human health. On the other hand, they could be a source of annoyance to people inside light weight structures (such as some residences) at a WTG site. A.R.H.

N81-14800# General Electric Co., St. Petersburg, Fla. Neutron Devices Dept.

ULTRASONIC CLEANER EVALUATION

T. J. Gillespie 8 Oct. 1980 22 p refs

(Contract DE-AC04-76DP-00656)

(GEPP-TIS-526) Avail: NTIS HC A02/MF A01

A method to evaluate the capabilities of ultrasonic cleaners is described. This method utilizes a ceramic plate on which a metallized coating has been deposited. The plate is immersed in a beaker filled with DI water and a few drops of liquid detergent. The plate is then subjected to a two-minute cleaning cycle. Measurement of the amount of metallized coating that is removed is determined with an image enhancement system. Use of this test reveals several factors that influence cleaning capabilities. These include system frequency, use of a wetting agent in the bath, bath temperature, fixture materials and fixture mounting. DOE

72 ATOMIC AND MOLECULAR PHYSICS

Includes atomic structure and molecular spectra.

N81-14801*# Virginia State Univ., Petersburg.

MUON SPIN ROTATION RESEARCH PROGRAM Annual Report, 1980

Carey E. Stronach 1980 35 p refs

(Grant NsG-1342)

(NASA-CR-163829) Avail: NTIS HC A03/MF A01 CSCL 20H

Data from cyclotron experiments and room temperature studies of dilute iron alloys and iron crystals under strain were analyzed. The Fe(Mo) data indicate that the effect upon the contact hyperfine field in Fe due to the introduction of Mo is considerably less than that expected from pure dilution, and the muon (+) are attracted to the Mo impurity sites. There is a significant change in the interstitial magnetic field with Nb concentration. The Fe(Ti) data, for which precession could clearly be observed early only at 468K and above, show that the Ti impurities are attractive to muon (+), and the magnitude of B(hf) is reduced far beyond the amount expected from pure dilution. Changes in the interstitial magnetic field with the introduction of Cr, W, Ge, and Si are also discussed. When strained to the elastic limit, the interstitial magnetic field in Fe crystals is reduced by 33 gauss, and the relaxation rate of the precession signal increases by 47%. A.R.H.

N81-14802# Siemens A.G., Munich (West Germany). Research Lab.

ELECTRON ENERGY LOSS SPECTROMETRY Final Report

Walter Kraus and Peter Fazekas Bonn Bundesmin. fuer Forsch. u. Technol. Dec. 1979 65 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie

(BMFT-FB-T-79-181; ISSN-0340-7608) Avail: NTIS HC A04/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 13.45

An experimental setup consisting of an electron microscope, an electron spectrometer, a measurement data recording and processing system, and an opto-electronic remote control unit is described which is capable of measuring electron energy losses with an energy resolution of better than 1 eV. The spectra recorded for a mass of about 10 to the -16th power g (e.g., oxygen, aluminum, titanium, silicon) show that electron energy loss spectrometry can be used to develop a highly sensitive technique for the microanalysis of materials. M.G.

N81-14803# National Physical Lab., Teddington (England). Div. of Electrical Science.

REALIZATION OF THE AMPERE, AND MEASUREMENT OF THE GYROMAGNETIC RATIO OF THE PROTON

P. Vigoureux and N. Dupuy Jan. 1980 30 p refs

(NPL-DES-59; ISSN-0143-7305) Avail: NTIS HC A03/MF A01

Realization of the ampere by means of the current balance, and measurements of the gyromagnetic ratio of the proton in a weak magnetic field are reviewed. The latest measurements suggest that the unit of current previously maintained exceeds the ampere by 5.5 parts in one million, and that the gyromagnetic ratio of the proton in a weak field is 6.4 in one million above a reference value of 267,510,000 rad s(-1)T(-1). An analysis of the sources of error of the recent work leads to a standard uncertainty of 4 in one million for the ampere, and of 0.5 in one million for the gyromagnetic ratio. A comparison of these results, and previous ones, with Kibble and Hunt's high-field value of the gyromagnetic ratio, shows a discrepancy of over 9 in one million between the direct and indirect methods of realizing the ampere. M.G.

N81-14804# Minnesota Univ., Minneapolis. School of Mathematics.

GAUGE THEORIES AND SPONTANEOUS SYMMETRY BREAKING Final Report, 1 Nov. - 15 Dec. 1979

D. H. Sattinger and O. L. Weaver Nov. 1980 46 p refs

(Contract DAAG29-79-M-0125)

(AD-A091800; ARO-16931.1-M) Avail: NTIS HC A03/MF A01 CSCL 20/10

This report summarizes attempts to understand in what way spontaneous symmetry breaking arose in the context of gauge field theories of elementary particles. The main interest was in

knowing whether techniques of bifurcation theory could be applied to the problem of spontaneous symmetry breaking in gauge field theories. It was felt that the symmetry breaking used by the physicists (a procedure known as the Higgs mechanism) is not precisely a bifurcation problem in the usual sense of the term, but more a matter of fixing a gauge and thereby reducing the amount of symmetry of the problem. In other words, it is not really a matter of 'spontaneous' symmetry breaking. GRA

N81-14805# Rochester Univ., N. Y. Dept. of Chemistry.
HIGH-ENERGY POSITRON IONIZATION OF ADSORBED SPECIES IN THE IMPULSE APPROXIMATION Interim Technical Report
Kai-Shue Lam and Thomas F. George Oct. 1980 17 p refs
(Contract N00014-80-C-0472; NR Proj. 056-749)
(AD-A091748; TR-7) Avail: NTIS HC A02/MF A01 CSCL 07/4

High-Energy Positron Ionization of adsorbed species is treated using the one-electron group-orbital linear-chain model and within the impulse approximation. Inter-orbital interference effects are found to be significant, leading to quenching (towards the low impact energy regime) and enhancement (at high impact energies) of ionization compared to positron gas-phase ionization. GRA

N81-14806# IRT Corp., San Diego, Calif.
***MOLECULAR BEAM STUDIES OF LOW ENERGY REACTIONS* Annual Summary Report**
R. H. Neynaber 31 Oct. 1980 9 p refs
(Contract N00014-80-C-0149; NR Proj. 393-004)
(AD-A091611; IRT-8199-001) Avail: NTIS HC A02/MF A01 CSCL 07/4

The report describes merging-beams studies of chemi-ionization and ion-molecule reactions. Included are investigations of the Ne^*-Ar, He^*-Ne, and HCl--Xe systems. A description is also given of how this research helps resolve unknown aspects of the areas investigated. GRA

N81-14807# Sandia Labs., Albuquerque, N. Mex.
ELECTRON PARAMAGNETIC RESONANCE OF MATERIAL PROPERTIES AND PROCESSES
K. L. Brower 1980 23 p refs
(Contract DE-AC04-76DP-00789)
(SAND-80-1230C; CONF-801124-2) Avail: NTIS HC A02/MF A01

The diagnostic value of electron paramagnetic resonance in the study of material properties and processes is demonstrated. Three EPR studies which demonstrate the elegance and uniqueness of EPR in atomic defect studies and exemplify unusual achievements through the use of new techniques for material measurement and preparation are discussed. A brief introduction into the origin, interaction, and detection of unpaired electrons is included. S.F.

N81-14808# Rockefeller Univ., New York.
DIFFRACTIVE PHOTON DISSOCIATION ON HYDROGEN (FERMILAB EXPERIMENT 612)
K. Goulianos 1980 5 p ref Presented at the 15th Recontre de Moriond Conf., Savoie, France, 9-21 Mar. 1980 Sponsored by DOE
(DOE/ER-02232/87; CONF-800374-8) Avail: NTIS HC A02/MF A01

An experiment designed to measure the inclusive diffractive dissociation of high energy photons on hydrogen, gamma p yields Xp, is described. Author

N81-14809# *Denison Univ., Granville, Ohio.*
DETERMINATION OF NEUTRON CROSS SECTIONS AND RESONANCE PARAMETERS FOR THE OSMIUM ISOTOPES 186, 187, AND 188, TI-205, S-32, THE STABLE TELLURIUM ISOTOPES AND OF THE 82 keV INELASTIC CROSS *SECTION FOR U-238 Progress Report, 1 Nov. 1979 - 30 Sep.* 1980
R. R. Winters Sep. 1980 7 p
(Contract DE-AS02-76ER-02696)
(DOE/ER-02696/9) Avail: NTIS HC A02/MF A01

Results of ongoing investigations in nuclear and astrophysics and reactor technology are briefly reported. A connection between the resonance structure revealed by the high energy resolution *neutron cross section measurements* and the average nuclear potential was demonstrated. Measurements of the capture cross sections of the isotopes of Osmium made possible a highly reliable estimate of the age of the chemical elements. Finally, the U-238 inelastic neutron scattering cross section near 82 keV (near the peak of the fast reactor neutron spectrum) was measured along with the capture cross sections of Ru-101, Rh-103 and Pd-105 isotopes. M.G.

N81-14810# Kansas Univ., Lawrence.
DEVELOPMENT OF EMPIRICAL POTENTIAL FUNCTIONS FOR THE STUDY OF MOLECULAR GEOMETRY AND APPLICATIONS TO CHLOROPHYLL A DIMERS Ph.D. Thesis
Tetsuro Oie 28 Jul. 1980 128 p refs
(DOE/ER-02837-T1) Avail: NTIS HC A07/MF A01

A large number of structurally diverse molecules were included in the development of the function due to the large number of variable chemical compositions and functional groups characteristically present in large molecules. The structural stabilities of various dimer models were examined by the empirical potential function. Detailed and quantitative information on these models is presented. T.M.

N81-14811# Ohio Univ., Athens.
***STUDY OF STRUCTURE OF NUCLEI WITH NEUTRONS AND* NUCLEAR DATA MEASUREMENT FOR MFE Progress Report, 1 Sep. 1979 - 31 Aug. 1980**
Raymond O. Lane 1980 98 p refs
(Contract DE-AC02-76ER-02490)
(DOE/ER-02490/1) Avail: NTIS HC A05/MF A01

Measurements of neutron differential elastic and inelastic scattering cross sections were made for 6Li 7Li 11B and 13C. For 7Li+n, a multichannel R-matrix analysis was completed, providing much new structure information for the compound 8Li system. These results are in very good agreement with recent theoretical model calculations, so that together the two provide considerable advancement in the state of our knowledge of 8Li. R-matrix analyses of 11B+n and 13C+n elastic scattering data were completed. For 13C+n theoretical model calculation were carried out and comparisons of these theoretical results with the R-matrix analysis are made. The triplet quadrupole spectrometer (TQS) is now fully operational. Development of new detectors, techniques, data analysis codes and theoretical model codes for use with the TQS system is complete. Measurements of (n,z) cross sections for fusion reactor structural materials, e.g., 58Ni, are currently underway. Construction of the long-flight-path tunnel for the swinger magnet facility was begun. Author

N81-14812# *Texas Univ. at Austin. Center for Particle* Theory.
THERMODYNAMIC INTERPRETATION OF MULTIPARTICLE *EMISSION IN RELATIVISTIC HEAVY ION COLLISIONS*
A. M. Gleeson and S. Raha Feb. 1980 17 p refs Sponsored by DOE
(DOE/ER-03992/388) Avail: NTIS HC A02/MF A01

The scattering of the heavy ion Ne off NaF at relativistic energy is analyzed. The spectra of the emission fragments are studied for evidence of a thermodynamic/hydrodynamic collective motion. Using fixed beam and target, the spectra of pion, deuteron and proton emission are fitted. The fit is consistent with an interpretation of an expanding hot fluid of interacting nucleons. Author

N81-14813# Brandeis Univ., Waltham, Mass. Dept. of Physics.
RESEARCH IN ELEMENTARY PARTICLE PHYSICS Technical Progress Report, 1 May 1979 - 29 May 1980
Lawrence E. Kirsch and Howard J. Schnitzer 1980 15 p refs
(Contract EY-76-S-02-3230)
(DOE/ER-03230/T1) Avail: NTIS HC A02/MF A01

Theoretical and experimental properties of elementary particles are examined. Phenomenology and quantum field theory, including effective field theories, quantum chromodynamics and supersymmetry, are considered. S.F.

N81-14814# Houston Univ., Tex. Dept. of Physics.
PION INTERACTIONS AT MEDIUM ENERGIES Progress

Report, 1 Dec. 1979 - 30 Nov. 1980
Bill W. Mayes, II and Ed. V. Hungerford, III Oct. 1980 31 p refs
(Contract EY-76-S-05-3948)
(DOE/ER-03948/12; ORO-3948-12) Avail: NTIS HC A03/MF A01

Experiments proposed and implemented involved the determination of nucleon-nucleon spin dependent amplitudes, mainly in the inelastic channels, and hypernuclear spectroscopy using the K(-), pi(-) reaction. Participation continued in the development of a new kaon beam facility at the AGS. DOE

N81-14815# Calspan Advanced Technology Center, Buffalo, N.Y. Aerodynamic Research Dept.
VIBRATIONAL ENERGY TRANSFER KINETICS IN MOLECULAR DISEQUILIBRIUM Status Report
J. William Rich Mar. 1980 13 p
(Contract DE-AC02-79ER-10458)
(DOE/ER-10458/1) Avail: NTIS HC A02/MF A01

The chemical kinetics of gaseous molecular systems under conditions of extreme disequilibrium of the vibrational energy modes are examined experimentally. A continuous wave carbon monoxide laser is used to excite the vibrational mode of carbon monoxide in mixtures of CO and various additive gases flowing through an absorption cell. High steady-state excitation of the CO vibrational mode (0.3 eV/molecule) is achieved, while a translational-rotational temperature near 300 K is maintained by the steady flow of cold gas into the cell. Reactant and product concentrations along the length of the reaction cell are monitored by a small monopole mass spectrometer. Quantitative measurement techniques for The cell sidelight emission are described. The kinetic mechanism by which V-V pumped CO reacted to produce vapor phase C2 is formulated. M.G.

N81-14816# Yale Univ., New Haven, Conn.
EXPERIMENTAL STUDIES OF ELECTRON IMPACT DEPOPULATION OF EXCITED STATES OF ATOMS: APPLICATIONS TO LASER DEVELOPMENT FOR FUSION AND ISOTOPE SEPARATION Final Report, 1 Jan. 1977 - 30 Jun. 1979
Michael S. Lubell Jun. 1980 24 p refs
(Contract ES-77-02-4199-A003)
(DOE/ES-04199/1) Avail: NTIS HC A02/MF A01

Techniques for obtaining measurements of metastable depopulation mechanisms of Ar and Kr in the KrF* rare gas monohalide excimer laser are discussed. An ultrahigh vacuum triple crossed beams apparatus, for the purpose of studying electron scattering from excited states of Ar and Kr atoms is described. A beam of metastable rare gas atoms, produced by near resonant charge transfer of rare gas ions with alkali neutral atoms, is crossed by an electron beam and a far red laser beam along mutually orthogonal axes. A hemispherical electron monochromator spectrometer pair is used to measure the cross section for electron scattering from the 2 sub p 9 excited state of the rare gas atom. M.G.

N81-14817# Texas Univ., Austin.
ION DYNAMICS AND THE UNIFIED TEARING MODE Ph.D. Thesis
Xiang-Seng Lee Aug. 1980 82 p refs
(Contract DE-AC05-76ET-53036)
(DOE/ET-53036/23; FRCR-218) Avail: NTIS HC A05/MF A01

The general theory based on the E-parallel variational principle provides the framework used for both the investigation of the ion dynamic effects and the study of the unification of tearing modes. A simple derivation of the ion magneto-viscosity terms is presented and the ultimate cancellation of their effects is displayed with those of the convective term's. The results of calculations of the ion dynamic effects are summarized. Numerical methods are used to show that all unstable tearing modes lie on the same branch of the slab model dispersion relation. In this sense, there is only one unstable tearing model. A practical result of the unification of modes is that, with any given set of parametric values, there is exactly one growth rate. J.M.S.

N81-14818# North Carolina Univ. at Chapel Hill.
RESEARCH ON ATOMIC AND MOLECULAR PHYSICS
Progress Report, 1 Sep. 1979 - 30 Nov. 1980
S. M. Shafroth and J. E. Willis 1980 22 p refs
(Contract ER-78-S-05-6027)
(DOE/ER-06027/2; PR-2) Avail: NTIS HC A02/MF A01

Several aspects of target thickness effects and radiative electron capture are summarized. Particular attention is given to parameterizing the Cu K electron ejection cross section vs target thickness in terms of the basic charge changing cross sections using a two component model and compare them with theory. R.C.T.

N81-14819# Oak Ridge National Lab., Tenn.
EVALUATION OF PHOTON PRODUCTION DATA FROM NEUTRON-INDUCED REACTIONS
C. Y. Fu 1980 19 p refs Presented at the Workshop on Nucl. Data Evaluation Methods and Procedures, Upton, N. Y., 22 Sep. 1980
(Contract W-7405-eng-26)
(CONF-800979-1) Avail: NTIS HC A02/MF A01

The evaluation methods and procedures used for generating the photon production data in the current evaluated nuclear data file (ENDF/B, Version V) are reviewed. There are 42 materials in the general purpose file of ENDF/B-V that contain data for prompt photon production. Almost all evaluations had substantial experimental data bases, but fewer than half of them employed any of the following evaluation methods. Only a few used theoretical techniques that are sophisticated enough to ensure internal consistency with other particle production data. Comments are made on four evaluation methods: the empirical formalism of Howerton et al., the Troubetzkoy model, the multiparticle Hauser-Feshbach/precompound model, and the Yost method. Critiques are also made on three procedures used for conserving photon energies in neutron capture reactions. The presence of photon production data in the file is useful for studying energy balance, since photon production generally accounts for a large portion of the reaction energy output. Problems found in energy balance checks are discussed. DOE

N81-14820# California Univ., Berkeley. Materials and Molecular Research Div.
PHOTOELECTRON PHOTOION MOLECULAR BEAM SPECTROSCOPY Ph.D. Thesis
D. J. Trevor Dec. 1980 155 p refs
(Contract W-7405-eng-48)
(LBL-11434) Avail: NTIS HC A08/MF A01

Photoexcitation in the vacuum ultraviolet was studied. Rotational relaxation and condensation due to supersonic expansion were shown to offer new possibilities for molecular photoionization studies. Molecular beam photoionization mass spectroscopy was extended above 21 eV photon energy by the use of Stanford Synchroton Radiation Laboratory facilities. Design considerations are discussed that advanced the state of the art in high resolution vuv photoelectron spectroscopy. To extend gas-phase studies to 160 eV photon energy, a windowless vuv-xuv beam line design is proposed. DOE

N81-14821 Indiana Univ., Bloomington.
MOMENT THEORY INVESTIGATIONS OF BORN APPROXIMATION SCATTERING PHENOMENA Ph.D. Thesis
Daniel Joseph Margollash 1980 453 p
Avail: Univ. Microfilms Order No. 8029241

The application of moment theory techniques to the study of inelastic scattering in the first Born approximation is examined. The task of constructing the complete set of discrete and continuum target eigenstates customarily required to calculate the doubly differential Born inelastic scattering cross section can be avoided by replacing the complete set of eigenstates with a suitably chosen complete, discrete, and quadratically integrable set of pseudostates. These pseudostates, when properly chosen, generate a discrete representation of the cross section whose energy moments converge to those of the actual cross section. Given these moments, the properties of the actual cross section, as well as the cross section itself, can be extracted using moment theory. Dissert. Abstr.

73 NUCLEAR AND HIGH-ENERGY PHYSICS

Includes elementary and nuclear particles; and reactor theory.

For space radiation see *93 Space Radiation.*

N81-14822# Rensselaer Polytechnic Inst., Troy, N. Y. Plasma Dynamics Lab.

HEAVY ION BEAM PROBING

R. L. Hickok Jul. 1980 56 p refs Presented at the IEEE Mini-Course on Modern Plasma Diagnostics, Madison, Wis., May, 1980 Sponsored by DOE

(DOE/ET-53004/2; RPDL-80-14) Avail: NTIS HC A04/MF A01

The principles of heavy ion beam probing are described and the types of measurements that can be made are discussed. The problems associated with implementing beam probes are noted, possible variations are considered and estimated costs of present day system, and the scaling requirements for large plasma devices are presented. Typical results that have been obtained on a variety of plasma devices are illustrated. A.R.H.

N81-14823# Sandia Labs., Albuquerque, N. Mex. Applied Technology Div.

SNOW: A DIGITAL COMPUTER PROGRAM FOR THE SIMULATION OF ION BEAM DEVICES

Jack E. Boers Aug. 1980 65 p refs Sponsored by DOE

(SAND-79-1027) Avail: NTIS HC A04/MF A01

A digital computer program, SNOW, was developed for the simulation of dense ion beams. The program simulates the plasma expansion cup (but not the plasma source itself), the acceleration region, and a drift space with neutralization if desired. The ion beam is simulated by computing representative trajectories through the device. The potentials are simulated on a large rectangular matrix array which is solved by iterative techniques. Poisson's equation is solved at each point within the configuration using space-charge densities computed from the ion trajectories combined with background electron and/or ion distributions. The simulation methods are described in some detail along with the examples of both axially-symmetric and rectangular beams. A detailed description of the input data is presented. Author

N81-14824# Illinois Univ., Urbana. Dept. of Physics.

NMR OF SMALL PLATINUM PARTICLES

Harold T. Stokes, Howard E. Rhodes, Po-Kang Wang, Charles P. Slichter, and J. H. Sinfelt (Exxon Research and Engineering Co., Linden, N. Y.) 1980 9 p refs

(Contract DE-AC02-76ER-01198)

(DOE/ER-01198/1324; CONF-801124-1) Avail: NTIS HC A02/MF A01

Platinum NMR lineshapes are presented as well as relaxation data in three different samples of platinum metal particles (46%, 26%, and 15% dispersion) supported on alumina. It is shown that the electronic properties of these particles are very much different from that of bulk Pt metal. A prominent peak in the lineshape is identified as a surface resonance which arises from Pt nuclei on the surface of the Pt particles. It is further shown that these surface Pt atoms are nonmetallic when coated with adsorbed molecules. DOE

N81-14825# Brown Univ., Providence, R. I. Dept. of Physics.

NUCLEAR EXCITATIONS AND REACTION MECHANISMS Progress Report, 1 Nov. 1979 - 30 Sep. 1980

S. Fallieros, S. F. Levin, and C. T. Li 1 Oct. 1980 28 p refs

(Contract DE-AC02-76ER-03235)

(DOE/ER-03235/1) Avail: NTIS HC A03/MF A01

Research concerning nuclear excitations and reaction mechanisms is described. Among the various subjects discussed are: photon scattering, consistency condition between seagull quadrapole terms and the absorption sum rule, Raman scattering to negative-parity states, non-local terms due to exchange and retardation effects in charge-transfer equations, consistency and meaning of various approximate channel coupling array equations, derivation of equations used in empirical nuclear reaction analyses, multi-cluster n-particle scattering theory, converged molecular bound state calculations, and WKB-type approximation in angular momenta for central potentials. L.F.M.

N81-14826# Washington Univ., St. Louis, Mo. Dept. of Chemistry.

INVESTIGATION OF NUCLEAR STRUCTURE AND NUCLEAR REACTIONS INDUCED BY COMPLEX PROJECTILES Technical Progress Report, 1 Nov. 1979 - 31 Oct. 1980

D. G. Sarantites 1980 47 p refs

(Contract DE-AS02-76ER-04052)

(DOE/ER-04052/T1; COO-4052-24) Avail: NTIS HC A03/MF A01

Mechanisms of heavy ion reactions were studied and included pre-equilibrium effects in fusion of C12 and Gd158, angular momentum transfer in incomplete fusion reactions, pre-equilibrium particle emission from fusion of C12 + Gd158 and Ne20 + Nd150, and nonequilibrium emission of neutrons from fusion like reactions of O16 with Sm154. Strongly damped heavy ion collisions were also investigated. A nuclear spin spectrometer was developed and coupled with an interactive off-line computer system for data analysis. T.M.

N81-14827# Savannah River Ecology Lab., Aiken, S. C.

LONG-TERM HIGH-LEVEL WASTE TECHNOLOGY Quarterly Technical Report, Oct. - Dec. 1979

W. R. Cornman Jun. 1980 72 p refs

(Contract DE-AC09-76SR-00001)

(DOE/SR/WM-79/2) Avail: NTIS HC A05/MF A01

Technical progress in site technology and in the more generic research and development on alternative forms of waste disposal is described. Topics discussed include in situ storage or disposal, waste retrieval, separation and concentration, waste fixation, including calcination and combustion processes, and onsite storage or disposal. Process and equipment development is covered along with canister development and characterization. J.M.S.

N81-14828# Oak Ridge National Lab., Tenn.

APPLICATION OF THE SHELL MODEL TO NUCLEAR SPECTROSCOPY

J. B. McGrory 1980 32 p refs Presented at the Intern. Summer School on Nucl. Struct., Dronten, Netherlands, 12-23 Aug. 1980

(Contract W-7405-eng-26)

(DOE/TIC-11287) Avail: NTIS HC A03/MF A01

A cursory overview of existing nuclear shell model technology is presented giving an indication of how well nuclear phenomena can be described by the nuclear shell model, and what are possible future directions of the field. The nuclear shell model is widely used. The combination of features that make the nucleus unique are: (1) the microscopic dimensions of the nucleus are such that one must use quantum mechanics; (2) at the level studied, it is a many body system with 1 to 300 particles; and (3) of the four 'fundamental' interactions (weak, strong, electromagnetic, and gravitational), only the gravitational force is generally ignorable. E.D.K.

N81-14829# Department of Energy, Aiken, S.C.

LONG-TERM HIGH-LEVEL WASTE TECHNOLOGY PROGRAM: STRATEGY DOCUMENT

Apr. 1980 81 p refs Revised

(DOE/SR/WM-79/3-Rev-4/80) Avail: NTIS HC A05/MF A01

This strategy document presents the research and development plan of the Division of Waste Products for long term immobilization of the high level radioactive wastes resulting from chemical processing of nuclear reactor fuels and targets. These high level wastes contain more than 99% of the residual radionuclides produced in the fuels and targets during reactor operations. They include essentially all the fission products and most of the actinides that were not recovered for use. E.D.K.

N81-14830# Department of Energy, Las Vegas, Nev.

NEVADA NUCLEAR WASTE STORAGE INVESTIGATIONS: QUALITY

Aug. 1980 26 p

(NVO-196-17) Avail: NTIS HC A03/MF A01

The geohydrologic setting and underground rock masses of the Nevada Test Site and contiguous areas were evaluated to

determine whether a suitable site exists for constructing a repository for isolating highly radioactive solid wastes. A quality assurance program which conforms to the criteria given in the Code of Federal Regulations is needed to control the quality aspects of the work. This Quality Assurance Plan describes the general quality assurance program for the overall project under which the quality assurance programs of the individual participating organizations and support contractors are to operate. DOE

N81-14831# Los Alamos Scientific Lab., N. Mex.
THREE-DIMENSIONAL SPACE-CHARGE CALCULATION METHOD
W. P. Lysenko and E. A. Wadlinger Sep. 1980 9 p refs
(Contract W-7405-eng-36)
(LA-8531-MS) Avail: NTIS HC A02/MF A01

A method is presented for calculating space charge forces on individual particles in a particle tracing simulation code. Poisson's equation is solved in three dimensions with boundary conditions specified on an arbitrary surface. When the boundary condition is defined by an impressed radio frequency field, the external electric fields as well as the space charge fields are determined. A least squares fitting procedure is used to calculate the coefficients of expansion functions, which need not be orthogonal nor individually satisfy the boundary condition. DOE

N81-14832# General Atomic Co., San Diego, Calif.
HIGH TEMPERATURE HEAT EXCHANGE: NUCLEAR PROCESS HEAT APPLICATIONS
D. L. Vrable Sep. 1980 11 p refs Presented at the Joint Japan/US Heat Transfer Seminar, Tokyo, 29 Sep. - 3 Oct. 1980
(Contract DE-AT03-76SF-71061; Gen. Atomic Proj. 7200)
(GA-A-16052; CONF-800983-1) Avail: NTIS HC A02/MF A01

The unique element of the HTGR system is the high temperature operation and the need for heat exchanger equipment to transfer nuclear heat from the reactor to the process application. This paper discusses the potential applications of the HTGR in both synthetic fuel production and nuclear steel making and presents the design considerations for the high temperature heat exchanger equipment. DOE

N81-14833# General Atomic Co., San Diego, Calif.
MEDIUM-SIZE HIGH TEMPERATURE GAS-COOLED REACTOR
C. O. Peinado and S. L. Koutz Aug. 1980 30 p refs Presented at Conf. on the Utilization of Small and Medium Size Power Reactors in Latin America, Montevideo, Uruguay, 12 May 1980
(Contract DE-AT03-76ET-35301)
(GA-A-15863; CONF-800578-2) Avail: NTIS HC A03/MF A01

This report summarizes high temperature gas cooled reactor (HTGR) experience for the 40 MW(e) Peach Bottom Nuclear Generating Station of Philadelphia Electric Company and the 330 MW(e) Fort St. Vrain Nuclear Generating Station of the Public Service Company of Colorado. Both reactors are graphite moderated and helium cooled, operating at about 760 C and using the uranium/thorium fuel cycle. The plants have demonstrated the inherent safety characteristics, the low activation of components, and the high efficiency associated with the HTGR concept. This experience was translated into the conceptual design of a medium sized 1170 MW(t) HTGR for generation of 450 MW of electric power. The concept incorporates inherent HTGR safety characteristics and engineered safety features. DOE

N81-14951*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
SPACE EXPERIMENTS WITH PARTICLE ACCELERATORS (SEPAC), STATUS REVIEW, 23 SEPTEMBER 1980
In its Space Plasma Phys. Active Expt. Oct. 1980 p 107-176 refs (For primary document see N81-14944 05-99)
Avail: NTIS HC A11/MF A01 CSCL 20H

74 OPTICS

Includes light phenomena.

N81-14834# Central Electricity Generating Board, Southampton (England). Marchwood Engineering Lab.
A GRAINLESS FOCUSING SCREEN FOR CAMERAS, MICROSCOPES AND OTHER OPTICAL INSTRUMENTS
J. M. Webster London Jun. 1980 3 p
(TDB-347) Avail: NTIS HC A02/MF A01

The objectionable granularity visible on a microscope or camera focusing screen can be eliminated by using bleached scatter plates which are essentially holograms of diffusing screens. These plates scatter incident light in a process of diffraction in a very complex manner. The resulting diffusion of scattering is all in a forward direction over a controlled and predetermined angle. Because there is little or no loss through unwanted scatter, the image is bright as well as virtually free of granular appearance. Any required prismatic effect can be included in the hologram. Any graticule can be printed onto the screen either before or after the holographic exposure. A.R.H.

N81-14835# Siemens A.G., Munich (West Germany). Technische Entwicklung.
MULTIPLEX OPERATION WITH PASSIVE DISPLAYS Final Report
Franz Kahm, Hans Helmut Krueger, Ekke Reichel, Miroslaw Tauer, and Karl-Heinz Walter Bonn Bundesmin. fuer Forsch. u. Technol. Apr. 1980 158 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-80-017; ISSN-0340-7608) Avail: NTIS HC A08/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 32.20

Basic problems in multiplexed liquid crystal displays (LCD) are addressed. Matrix addressing was optimized by conception and layout of driving circuits. Bistability displays with 1 : 128 multiplex drive and up to 82,000 picture elements for terminal were built and tested. Alphanumeric LCD systems were made, e.g. for portable computer terminals. The cosmetic quality of these displays was considerably improved by optimum cell technology and by selection of LC- mixtures. Pleochroic dyes for absorptive displays, future LCD, are evaluated. Multiplexed LCD is best utilized where battery operation is wanted, where the display could be readable under all lighting conditions, and where flexibility in display size and information content is necessary. M.G.

N81-14836# United Kingdom Atomic Energy Authority, Culham (England). Culham Lab.
FIELD EMISSION ELECTRIC PROPULSION ION OPTICS OF SLIT EMITTERS AND BEAM FOCUSSING Final Report
C. L. Thomas, P. F. Little, C. Mahony, and C. Banks Paris ESA Jun. 1980 126 p refs
(Contract ESTEC-3686/78/ML(JS))
(CLM/RR/E1/28; ESA-CR(P)-1376) Avail: NTIS HC A07/MF A01

Ion trajectory and electrostatic field calculations for 8 micron and 2 micron slit emitters are reported. For the 8 micron slit the maximum probe angle given by the ion trajectory calculations is not as large as that measured in previous tests. It is suggested that the discrepancy is due to scattering by neutrals within the beam. Breakdown criteria show that the 8 micron slit is capable of producing 50 mA but the 2 micron slit can only produce 17 mA. The electric field inside the slits is calculated for a variety of liquid surfaces and theories for the action of an electric field on a liquid surface are considered. For the 2 micron slit the emitter accelerator distance is doubled and a maximum current of 16 mA but no significant decrease in the maximum probe angle is found. A mathematical analysis of the various processes at the emitter and within the beam is presented. The energy distribution of the beam is derived. It is found that if slow ions are created sufficiently far from the emitter then the emergent angle of the 8 micron slit beam can be reproduced computaticnally. The dynamics of the liquid tip and the size of emitted droplets are also considered. M.G.

N81-14837# Plessey Co. Ltd., Towcester (England). Allen Clark Research Center.
EVALUATION AND ASSESSMENT OF LOW NOISE PREAMPLIFIERS FOR INFRARED DETECTORS Final Report
M. J. Birch, J. B. Mason, R. Sneddon, and T. C. Leslie Paris

ESA Aug. 1980 252 p refs
(Contract ESTEC-4089/79-NL-PP(SC))
(CD.6500671; ESA-CR(P)-1377) Avail: NTIS HC A12/MF A01

The evaluation and assessment of low noise preamplifiers, together with the feasibility of fabricating a compact, low weight, multichannel preamplifier (based on the evaluated amplifiers), for possible implementation in the infrared channels of an Ocean Colour Monitoring instrument was carried out. The choice of available amplifiers with sufficiently high noise performance was found to be small; as a result only five types of amplifier were evaluated. From these, two were selected, intended for use with different types of detector: two possible configurations for 10 channel preamplifiers, based on modified versions of the selected amplifiers, are outlined. Operation of silicon semiconductors at very low temperatures is investigated which suggests that amplifiers could be designed to operate at temperatures compatible with the operation of cooled infrared detectors.

Author

N81-14838# Naval Academy, Annapolis, Md. Physics Dept.
NEUTRON RADIATION EFFECTS IN FIBER OPTICS Final Report, 1979 - 1980
Mark Jeffrey Marshfield 5 Jun. 1980 46 p refs
(AD-A091661; USNA-TSPR-107) Avail: NTIS HC A03/MF A01 CSCL 20/6

The damage produced in optical fibers by fast neutrons has been studied with reference to the recovery of the fibers tested. The fibers were subjected to varying doses of neutrons. Individual wavelengths were monitored during the irradiation and post-irradiation recovery processes. Recovery rates for each particular wavelength were studied to determine the bleaching effect of the monitoring light at that wavelength. The wavelength was varied over the lower operating range of the fibers, 700 to 950 nm in increments of 50 nm. Further measurements were taken to determine the bleaching effect of ultraviolet light. Theory suggests that damage caused by high energy neutrons, known to create absorption bands in the ultraviolet range, should show bleaching effects when high intensity ultraviolet light is transmitted through the fiber. Neutral density filters were utilized to determine the dependence of recovery on the intensity of ultraviolet light used. The bleaching effect of a white light source was also studied. Here again, it is believed that the input of high intensity light should be able to bleach out any defects which may have been created by the neutron irradiation. GRA

N81-14839# Honeywell Corporate Technology Center, Bloomington, Minn.
THE DEVELOPMENT OF FLUORIDES FOR HIGH POWER LASER OPTICS Final Report, 1 Apr. 1978 - 31 Mar. 1980
J. F. Ready and H. Vora Jul. 1980 54 p refs
(Contract DE-AC08-78DP-40020)
(DOE/DP-40020/1) Avail: NTIS HC A04/MF A01

The laser assisted thermonuclear fusion program has need for improved optical materials with high transmission in the ultraviolet, and with low values of nonlinear index of refraction. Lithium fluoride possesses a combination of optical properties which are of use. Single crystalline LiF is limited by low mechanical strength. The technique of press forging to increase the mechanical strength is investigated. LiF single crystals were press forged over the temperature range 300 - 600 C to produce fine grained polycrystalline material. Optical homogeneity at 633, stress birefringence, scattering at 633, residual absorption over the spectral range 339 - 3800 nm, and laser damage thresholds for 1 ns, 1064 nm and 700 ps, 266 nm laser pulses are evaluated. Single crystals can be press forged without seriously degrading their optical properties. Yield strength in compression, proportional limit and fracture strength in 3 and 4 point bending, fracture energy, and threshold for microyield are discussed. S.F.

N81-14840# Washington Univ., Seattle. Dept. of Physics.
PRODUCTION OF OPTICALLY THIN FREE-STANDING OIL FILMS FROM THE EDGE OF A ROTATING DISC
James G. G. Cramer 1980 12 p refs Sponsored in part by DOE
(DOE/ER-01388/457) Avail: NTIS HC A02/MF A01

A method is described for forming thin free-standing oil films which are spun from the edge of a sharp-edged rotating disc. The films can be made thin enough to show strong optical interference colors when viewed in white light. The thinnest films have areal densities down to about 10-20 microns gm/sq cm. A stable roughly triangular film with an area of about 10 sq cm and fairly uniform thickness can be readily produced. Much larger films having either greater thickness or less stability are also possible. Films have been produced both in air and in vacuum.

A.R.H.

75 PLASMA PHYSICS

Includes magnetohydrodynamics and plasma fusion.

For ionospheric plasmas see *46 Geophysics*. For space plasmas see *90 Astrophysics*.

N81-14841# Nagoya Univ. (Japan). Inst. of Plasma Physics.
NUMERICAL SIMULATION OF DENSITY EVOLUTION IN JIPP T-2 TOKAMAK
K. Shimizu (Osaka Univ.) Oct. 1980 31 p refs
(IPPJ-483) Avail: NTIS HC A03/MF A01

The density evolution in JIPP T-2 Tokamak during gas injection is numerically analyzed using a one dimensional Tokamak transport code. The numerical model contains the neoclassical transport including the trapped particle pinch effect (the Ware pinch), empirical anomalous particle and electron heat transports based on ALCATOR scaling, neutral particle transport and oxygen impurity transport. The Ware pinch effect is significant for the central density rise. The inversion of density profile in the inner region during gas puffing cannot be explained. However, the rate of the central density rise observed in the experiment is well explained by the simulation if the energy of recycling neutrals is several tens eV. The effects of ion temperature gradient drift instability on the density evolution are also investigated. Author

N81-14842# Nagoya Univ. (Japan). Inst. of Plasma Physics.
CHAOTICALLY TRANSITIONAL PHENOMENA IN THE FORCED NEGATIVE-RESISTANCE OSCILLATOR
Yoshisuke Ueda (Kyoto Univ., Japan) and Norio Akamatsu (Tokushima Univ., Japan) Oct. 1980 38 p refs
(IJJP-482) Avail: NTIS HC A03/MF A01

When a periodic excitation is injected into the self-oscillatory system, either synchronized periodic oscillation or asynchronized nonperiodic oscillation comes out. Among the latter type of oscillations, chaotic oscillation frequently takes place which is different from almost periodic oscillations. Experimental studies using analog and digital computers were out to clarify the difference between the almost periodic oscillations and the chaotically transitional processes. Various strange attractors representing chaotically transitional processes and their average power spectra are given, discussed, and compared with the results obtained in the forced oscillatory systems. A.R.H.

N81-14843# Nagoya Univ. (Japan). Inst. of Plasma Physics.
RELATION BETWEEN WEIBEL INSTABILITY AND MAGNETIC FIELD GENERATING THERMAL INSTABILITY
Masatada Ogasawara and Akinari Hirao Nov. 1980 21 p refs
(IPPJ-485) Avail: NTIS HC A02/MF A01

Comparison of the mechanisms of the Weibel instability and the field generating thermal instability is made on the basis of the Boltzmann equation. The case is perpendicular to the direction of the gradients of T sub 0 and N sub 0 is investigated, where k is the wavevector, T sub 0 and n sub 0 are the zeroth order temperature and the number density. In the collisional plasma (kl sub M << 1, where 1 sub M is the electron mean free path) the thermal instability arises but the Weibel instability does not. In the collisionless case (kl sub M >> 1), the situation is vice versa. When the equilibrium velocity distribution function is expanded by the Legendre polynomials P sub L with the polar axis along the gradients of T sub 0 and n sub 0, L=0 and L=1 components are essential, respectively, for the Weibel instability and the thermal instability. M.G.

N81-14844# Nagoya Univ. (Japan). Inst. for Plasma Physics.
NUMERICAL STUDY OF EXPLOSIVE TEARING MODE INSTABILITY IN ONE-COMPONENT PLASMAS

Toshio Terasawa Nov. 1980 51 p refs Submitted for publication Sponsored in part by Japanese Ministry of Education
(IPPJ-486) Avail: NTIS HC A04/MF A01

A numerical simulation is performed to investigate the nonlinear phase of the collisionless tearing mode instability. The results are found consistent with a theory predicting the existence of an explosive phase of the instability caused by the magnetization of particles by the perturbed component of the magnetic field normal to the neutral sheet. Although electrostatic effects on the evolution of the instability is neglected a priori in the present numerical simulation, there seems to be a good possibility of the explosive evolution of the tearing mode instability in its nonlinear stage. It is further noted that the particles are heated adiabatically within the magnetic islands by the one dimensional compression process. M.G.

N81-14845# Nagoya Univ. (Japan). Inst. of Plasma Physics.
A COMPUTER SIMULATION ON MICROINSTABILITIES AND ANOMALOUS RESISTIVITY NEAR THE MAGNETIC NEUTRAL SHEET
Motohiko Tanaka (Tokyo Univ., Japan), Tetsuya Sato (Hiroshima Univ., Japan), and Tetsuo Kamimura Nov. 1980 50 p refs
(IJJP-487) Avail: NTIS HC A03/MF A01

Microinstabilities in a field-reversed plasma were studied using a 2 D magnetostatic particle code. It was observed that a flute instability occurs in local regions with steep density gradient off the neutral sheet; its frequency is approximately the lower-hybrid frequency and the wavelength is near the electron Larmor radius. The observed dispersion relation suggests that the instability must be the lower-hybrid-drift instability (LHDI). The initial laminar diamagnetic current is rapidly disturbed to form E x B electron vortices, with simultaneous electron and ion acceleration in the neutral sheet. On the neutral line where the plasma Beta is extremely large, an unstable electromagnetic mode is observed to develop after the LHDI saturates; accordingly, the magnetic neutral line is deformed into a meandering structure. Anomalous resistivity and anomalous plasma transport are observed associated with the development of the LHDI; even on the neutral line there exists a small but finite resistivity which is attributed to the unstable magnetic mode. A.R.H.

N81-14846# Nagoya Univ. (Japan). Inst. of Plasma Physics.
ON A NEW SERIES OF INTEGRABLE NONLINEAR EVOLUTION EQUATIONS
Yoshi H. Ichikawa, Miki Wadati (Tokyo Univ.), Kimiaki Konno (Nihon Univ.), and Tohru Shimizu (Tsukuba Univ.) Oct. 1980 29 p refs
(IPPJ-484) Avail: NTIS HC A03/MF A01

The derivative nonlinear Schroedinger equation for the circular polarized Alfven wave admits the spiky soliton solutions for the plane wave boundary condition. The nonlinear equation for complex amplitude associated with the carrier wave is shown to be a generalized nonlinear Schroedinger equation having the ordinary cubic nonlinear term and the derivative of cubic nonlinear term. A generalized scheme of the inverse scattering transformation confirms that superposition of the A-K-N-S scheme and the K-N scheme for the component equation is valid for the generalized nonlinear Schroedinger equation. Two types of integrable nonlinear evolution equations were derived from inverse scattering transformation. One is the type of nonlinear Schroedinger equation; while the other is the type of Korteweg-de Vries equation. Stationary solitary wave solutions were constructed for the integrable nonlinear evolution equation of the second type. The solutions have peculiar structure in that they are singular and discrete. A.R.H.

N81-14847# Nagoya Univ. (Japan). Inst. of Plasma Physics.
CROSS SECTIONS FOR CHARGE TRANSFER COLLISIONS INVOLVING HYDROGEN ATOMS
Y. Kaneko (Tokyo Metropolitan Univ., Japan), T. Arikawa (Tokyo Univ. of Agriculture and Technology, Japan), Y. Itikawa (Kansai Medical Univ., Japan), T. Iwai (Kansai Medical Univ., Japan), T. Kato (Electrocommunications Univ., Tokyo, Japan), M. Matsuzawa (Electro-Communications Univ., Tokyo, Japan), Y. Nakai (Japan Atomic Energy Research Inst., Japan), K. Okuno (Tokyo Metropolitan Univ., Japan), H. Ryufuku (Japan Atomic Energy Research Inst.), H. Tawara (Tokyo Univ., Japan) et al Oct. 1980 186 p refs Submitted for publication
(IPPJ-AM-15) Avail: NTIS HC A09/MF A01

Experimental data on the cross section for H + X sup qt yields H(+) + X sup (q-1)+ are compiled for any element X and charge state q. The result is shown in graphs as a function of collision energy. A scaling law for the cross section is derived theoretically to provide quantitative information for highly-stripped ions for which no data are available. Cross sections for some related processes are also shown. Author

N81-14848# Nagoya Univ. (Japan). Inst. of Plasma Physics.
[CONFINEMENT AND HEATING OF PLASMAS] Annual Review, Apr. 1979 - Mar. 1980
Mar. 1980 219 p refs
(ISSN-0547-1567) Avail: NTIS HC A10/MF A01

Progress is reported in the following areas: JIPP T-2 device experiments; high beta pinch plasmas; radio frequency containment; high energy beam experiments; bumpy toruses; laser produced plasmas; basic experiments in plasma physics; atomic processes; technology and applied plasma physics; plasma theory and computations; and the computer center services. A.R.H.

N81-14849# Nagoya Univ. (Japan). Inst. of Plasma Physics.
MIXING LENGTH HYPOTHESIS IN THE DISSIPATIVE TRAPPED ION INSTABILITY
A. Hatayama, Y. Koshi, and M. Ogasawara Oct. 1980 13 p refs
(IPPJ-481) Avail: NTIS HC A02/MF A01

The mixing length hypothesis is investigated for the purpose of making the underlying idea of the hypothesis clear in the case of the dissipative trapped ion instability. Three different approaches are employed: (1) analogy to the ordinary turbulence in hydrodynamics; (2) a nonlinear turbulent collision theory; and (3) a quasilinear theory of the density flattening. If the isotropic turbulence is assumed, the mixing length hypothesis can be derived by the first two approaches. The formula (D is approximately gamma/the wave number perpendicular to the magnet field squared) which is usually obtained from the mixing length hypothesis, can be derived by the third approach. Author

N81-14850# Istituto Superiore di Sanita, Rome (Italy). Lab. delle Radiazioni.
ELECTRON SPIN RESONANCE OF HOMOZYGOUS BETA THALASSEMIC PLASMA
S. Cannistraro, P. L. Indovina, A. Rosati, and L. Sportelli 6 Nov. 1979 25 p refs In ITALIAN; ENGLISH summary Submitted for publication
(ISS-P-79/13; ISSN-0390-6469) Avail: NTIS HC A02/MF A01

Homozygous beta thalassemic plasma shows an electron spin resonance signal which is not present in normal and teterozygous plasma. This signal exhibits a departure from tetragonal symmetry toward rhombic. Binding by a serum protein is responsible for this distortion. Heme-human albumin complex exhibits a similar rhombic distortion. S.F.

N81-14851# Stuttgart Univ. (West Germany). Inst. fuer Plasmaforschung.
NON-AXISYMMETRIC (M=PLUS OR MINUS 1) ALFVEN WAVES IN A CYLINDRICAL PLASMA
G. Mueller, E. Raeuchle, and P. G. Schueller Jan. 1980 23 p refs In GERMAN; ENGLISH summary
(IPF-80-1) Avail: NTIS HC A02/MF A01

The dispersion of non-axisymmetric alfven waves is investigated experimentally and theoretically. The azimuthal mode numbers are m = + 1 and m = - 1. The waves are excited in a cylindrical plasma by a multipole antenna in the frequency range of 0.3 - 1.5 MHZ. The waves of the type m = + 1 and m = - 1 are launched separtely by using an antenna system with a broad band phase shifter. The experimental and theoretical results are in good agreement. Author

N81-14852# Stuttgart Univ. (West Germany). Inst. fuer Plasmaforschung.
FORCED AND FREE MAGNETOACOUSTIC OSCILLATIONS OF TOROIDAL ARGON PLASMAS
A. L. McCarthy (Flinders Univ., Australia) and E. Raeuchle Mar. 1980 30 p refs
(IPF-8-3) Avail: NTIS HC A03/MF A01

Numerical calculations were made of the eigenfrequencies and eigenfunctions for the magnetoacoustic oscillations of a uniform density, resistively damped toroidal plasmas in a steady toroidal magnetic field. When calculations of the forced oscillations of the same plasma are made the frequencies at which maximum response occurs agree with the real part of the eigenfrequencies and the spatial distribution of the oscillatory fields resemble the eigenfunctions. But for the particular forcing fields chosen not all of the eigenmodes are excited. S.F.

N81-14853# Stuttgart Univ. (West Germany). Inst. fuer Plasmaforschung.

WAVE PROPAGATION IN A DEUTERIUM-HYDROGEN-OXYGEN PLASMA IN THE RANGE OF ION CYCLOTRON FREQUENCIES

G. Janzen Mar. 1980 30 p refs In GERMAN; ENGLISH summary

(IPF-80-5) Avail: NTIS HC A03/MF A01

In a temperature plasma of deuterium in a high relative concentration, and hydrogen and oxygen in minority concentrations between 1 percent and 10 percent, the left hand polarized wave propagating parallel to the magnetic field lines exhibits high damping at the cyclotron frequencies of the ions. Small amounts of oxygen impurity destroy the hydrogen ion cyclotron resonance completely. At low ion temperatures the separate ion cyclotron resonances combine to form new resonances weighted according to mass and concentration. At right angles to the magnetic field lines, the extraordinary wave exhibits the ion hybrid resonances with strong damping. At low ion temperatures, even small oxygen admixtures destroy the hybrid resonance between hydrogen and the bulk of the plasma. At higher temperatures, the hybrid resonances are pronounced. At oblique angles of propagation, both the ion cyclotron and ion hybrid effects are found. Approaching parallel propagating, the ion hybrid resonances disappear, and at near perpendicular propagation the ion cyclotron resonances are no longer present. A.R.H.

N81-14854# Siemens A.G., Erlangen (West Germany).

SUPPLEMENTARY INVESTIGATIONS TO FUNDAMENTAL RESEARCH PROGRAM PLASMA TECHNIQUES Final Report

Walter Hertz, Juergen Mentel, Harald Motschmann, Wilhelm Tiemann, and Jan Troh Bonn Bundesministerium fuer Forschung und Technologie Dec. 1979 192 p refs In GERMAN, ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie

(BMFT-FB-T-79-43; ISSN-0340-7608) Avail: NTIS HC A09/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 40

The ac discharges in SF6 gas flows in a model double nozzle circuit breaker are investigated. Holographic systems were used to investigate the SF6 flow in a double nozzle circuit breaker model with and without an arc. The gas flow interferograms are evaluated and a program is developed to perform a theoretical calculation between density and velocity for adiabatic flow in SF6. M.G.

N81-14855# Royal Inst. of Tech., Stockholm (Sweden). Dept. of Plasma Physics and Fusion Research.

LINEAR MODE CONVERSION IN A TOROIDAL PLASMA Research and Training Programme on Controlled Thermonuclear Fusion and Plasma Physics (EUR-NE)

T. Hellsten May 1980 28 p refs Supported in part by EURATOM, and the Max-Planck Inst.

(TRITA-PFU-80-06; ISSN-0348-7644) Avail: NTIS HC A03/MF A01

Linear mode conversion at the perpendicular ion cyclotron resonance is treated for an axially symmetric toroidal plasma. The mode conversion appears between a fast electromagnetic wave and a slow quasi-electrostatic wave, due to finite electron inertia. The problem reduces to the Orr-Sommerfeld equation where the coefficients determining the reflection, transmission, and conversion are functions of the arc length along a poloidal intersection of the resonance surface. These coefficients can be determined from eigenfunctions of an ordinary differential equation. S.F.

N81-14856# Royal Inst. of Tech., Stockholm (Sweden). Dept. of Plasma Physics.

CRITICAL IONIZATION VELOCITY EFFECTS IN ASTROPHYSICAL PLASMAS

Michael A. Raadu Aug. 1979 20 p refs Presented at 17th Gen. Assembly of the Intern. Astron. Union, Montreal, Aug. 1979

(TRITA-EPP-79-14) Avail: NTIS HC A02/MF A01

Critical ionization velocity effects are relevant to astrophysical situations where neutral gas moves through a magnetised plasma. The underlying mechanism depends on the combined effects of electron impact ionization and electron energisation by collective plasma interactions. For low density plasmas a theory based on a circular process involving electron heating through a modified two stream instability is developed. Several applications of critical velocity effects to astrophysical plasmas are discussed. The importance of the effect in any particular case may be determined from a detailed consideration of energy and momentum balance, using appropriate atomic rate coefficients and taking full account of collective plasma processes. Author

N81-14857# Royal Inst. of Tech., Stockholm (Sweden). Dept. of Plasma Physics.

SOME NECESSARY PARAMETERS FOR A CRITICAL VELOCITY INTERACTION BETWEEN THE IONOSPHERIC PLASMA AND A XENON CLOUD

I. Axnaes Dec. 1979 21 p refs

(TRITA-EPP-79-20) Avail: NTIS HC A02/MF A01

The conditions for an experiment to study the critical ionization velocity effect in the interaction between a Xenon cloud, released from a satellite, and the ionospheric plasma, are investigated. The model used is based on the assumption that there exists an effective process that transfers the energy, that is available in the relative motion, to the electrons. Some necessary conditions to obtain significant heating or deceleration of the plasma penetrating the cloud are calculated. The conditions are given by the energy available in the relative motion and the rates of the different binary collision processes involved. As the released gas cloud expends the possibilities for a critical velocity interaction will exist only within a certain range of cloud radii. The charge transfer collision cross section between the ionospheric ions and the cloud atoms is an important parameter. Xenon is a suitable gas in that respect. Author

N81-14858# Royal Inst. of Tech., Stockholm (Sweden). Dept. of Plasma Physics.

ELECTROSTATIC DOUBLE LAYERS AND A PLASMA EVACUATION PROCESS

M. A. Raadu and P. Carlqvist Dec. 1979 36 p refs Sponsored by Swedish Board for Space Activities, ESA, and Swedish National Science Research Council

(TRITA-EPP-79-21; ISSN-0348-7539) Avail: NTIS HC A03/MF A01

An evacuation process due to the growth of current driven instabilities in a plasma is discussed. The process, which leads to localized extreme density reductions, is related to the formation of electrostatic double layers. The initial linear phase is treated using the superposition of unstable plasma waves. In the long wave length, non-dispersive limit a density dip which is initially present as a small disturbance, grows rapidly and remains localized in the plasma. The process works for a variety of plasma conditions provided a certain current density is exceeded. For a particular choice of plasma parameters, the non-linear development is followed by solving the coupled Vlasov-Poisson equations by finite difference methods. The evacuation process is found to work even more effectively in the non-linear phase and leads to an extreme density reduction within the dip. It is suggested that the growth of such structures produces weak points within the plasma that can lead to the formation of double layers. Author

N81-14859# Royal Inst. of Tech., Stockholm (Sweden). Dept. of Plasma Physics.

ROCKET MEASUREMENTS OF ELECTRIC FIELDS, ELECTRON DENSITY AND TEMPERATURE DURING THE THREE PHASES OF AURORAL SUBSTORMS

G. Marklund, L. P. Block, and P.-A. Lindqvist Dec. 1979 32 p

refs
(TRITA-EPP-79-22; ISSN-0348-7539) Avail: NTIS HC A03/MF A01

Three rocket payloads were launched from Kiruna, Sweden, into different phases of two successive auroral substorms. Among other experiments, the payloads carried the RIT double probe electric field experiments, providing electric field, electron density and temperature data, which are presented here. These are discussed in association with observations of particles, ionospheric drifts (STARE) and electric fields in the equatorial plane (GEOS). The motions of the auroral forms, as obtained from auroral pictures are compared with the bar E x bar B/sq B drifts and the currents calculated from the rocket electric field and density measurement with the equivalent current system deduced from ground based magnetometer data (Scandinavian magnetometer array). Author

N81-14860# Royal Inst. of Tech., Stockholm (Sweden). Dept. of Plasma Physics.

PROPERTIES OF A FLUCTUATING DOUBLE LAYER IN A MAGNETIZED PLASMA COLUMN

S. Torven and L. Lindberg Apr. 1980 26 p refs Sponsored by Swedish National Science Research Council
(TRITA-EPP-80-02; ISSN-0348-7539) Avail: NTIS HC A03/MF A01

Wave phenomena at a strong electric double layer were investigated in a magnetized plasma column where the electron gyro frequency is smaller than the plasma frequency. Fluctuations with frequencies below the ion plasma frequency and high frequency fluctuations peaked close to the electron plasma frequency dominated. The low and high frequency fields have characteristic spatial distributions in the form of single humps with the position of the maxima related to the double layer position. Spatial correlation measurements show that the high frequency field is associated with axially propagating waves. The phase velocity is nearly constant over a wide range of frequencies and 10% to 20% smaller than the velocity of the electron beam that is formed in the layer. The double layer is characterized by a steep potential gradient in a central region with a thickness of about 20 Debye lengths. This region is surrounded by 'presheaths' where free electrons and ions are accelerated towards the layer. The role of the ionization in the anode plasma is discussed. A.R.H.

N81-14861# Royal Inst. of Tech., Stockholm (Sweden). Dept. of Plasma Physics.

STUDIES OF ELECTROSTATIC DOUBLE LAYERS WITH APPLICATIONS TO COSMIC PLASMAS Ph.D. Thesis

Per Carlquist Apr. 1980 38 p refs
(TRITA-EPP-80-03; ISSN-0348-7539) Avail: NTIS HC A03/MF A01

Studies of electrostatic double layers with applications to cosmic plasmas are discussed. Laboratory experiments on double layers are briefly described. The theory of double layers is starting with a discussion of the general properties of double layers. A few models of double layers are considered and an account of some necessary conditions for the existence of steady double layers is given. A survey of possible mechanisms for the formation and persistence of double layers is included. Cosmic double layers are discussed. Various indications of the existence of double layers in the ionosphere and magnetosphere of the Earth are considered. The possible existence of double layers in the solar atmosphere is considered. A model of solar flares and a model of solar surges, both based on double layers, are described in some detail. S.F.

N81-14862# Royal Inst. of Tech., Stockholm (Sweden). Dept. of Plasma Physics and Fusion Research.

***A PROPOSED NEUTRON SPECTROMETER SYSTEM FOR JET* Research and Training Program on Controlled Thermonuclear Fusion and Plasma Physics (EUR-NE)**

T. Elevant, G. Hellblom (Studsvik Science Research Lab., Nykoeping, Sweden), B. Holmqvist (Studsvik Energiteknik AB, Nykoeping, Sweden), S. Malmskog, and J. Scheffel Dec. 1979 70 p refs
(TRITA-80-02; ISSN-0348-7644) Avail: NTIS HC A04/MF A01

A neutron spectrometer system is proposed primarily for measurements of ion temperature and density and ion beam energy distribution in extended fusion plasmas. Three different spectrometers are involved: time of flight, proton recoil and 3He. Six order of magnitudes in flux ranges will be covered by the system when employing multitarget systems. A neutron collimator and shielding system are desirable in order to obtain relevant information. S.F.

N81-14863# Royal Inst. of Tech., Stockholm (Sweden). Dept. of Plasma Physics and Fusion Research.

ON PLASMA EQUILIBRIUM IN A POLOIDAL MAGNETIC FIELD Research and Training Programme on Controlled Thermonuclear Fusion and Plasma Physics (EUR-NE)

B. Lehnert Feb. 1980 18 p refs
(TRITA-PFU-80-03; ISSN-0348-7644) Avail: NTIS HC A02/MF A01

The balance of forces is considered for the toroidal equilibrium of a plasma being confined in a purely poloidal magnetic field. In addition to the pinch forces, this balance involves a loop force due to the joint effect of the pressure and the magnetic field from the plasma current on one hand, and the external field force due to the field from currents in a set of external conductors on the other. A simple method is proposed by which estimates can be made of the magnitude and direction of the latter force. The method shows that equilibrium becomes possible for a class of external conductor (extrap) configurations where the major radius of the plasma body is much larger than its minor radius. Author

N81-14864# Royal Inst. of Tech., Stockholm (Sweden). Dept. of Plasma Physics and Fusion Research.

ON THE ENERGY PRINCIPLE FOR PLASMA MHD STABILITY IN PRESENCE OF AN INHOMOGENEOUS MAGNETIC VACUUM FIELD Research and Training Programme on Controlled Thermonuclear Fusion and Plasma Physics (EUR-NE)

B. Lehnert Mar. 1980 33 p refs
(TRITA-PFU-80-04; ISSN-0348-7644) Avail: NTIS HC A03/MF A01

The expression for potential energy changes given in terms of the energy principle by Bernstein et al. was rearranged in order to account for the effects of induced surface currents. This reformulated expression was used to study the influence of an imposed transverse strongly inhomogeneous magnetic vacuum field on the MHD stability of a toroidal magnetically confined plasma column. It was found that electromagnetic modes in toroidal 'Extrap' configurations become subject to a strong stabilizing effect from the corresponding inhomogeneous vacuum field and associated induced surface currents. In the special case of a slender toroidal plasma body being immersed in a strongly inhomogeneous vacuum field, these stability properties remain essentially the same as in a corresponding straight geometry. Earlier stability criteria for radial and axial displacements are reconsidered, in particular their relation to the effects of a finite plasma pressure and of electromagnetic induction. A.R.H.

N81-14865# *Royal Inst. of Tech.*, Stockholm (Sweden). Dept. of Plasma Physics and Fusion Research.

***THE EFFECTS OF RADIATING IMPURITIES AND BOEHM TRANSPORT IN A COOL PLASMA MANTLE* Research and Training Programme on Controlled Thermonuclear Fusion and Plasma Physics (EUR-NE)**

Andras Kuthy May 1980 17 p refs Supported by Euratom
(TRITA-PFU-80-05; ISSN-0348-7644) Avail: NTIS HC A02/MF A01

The size of a plasma mantle, with temperatures below the sputtering limit, depends on the heat flux and the heat conductivity. Oxygen densities above 10 to the 17th power/cu m require large heat fluxes. These cause the mantle to become narrower than the mean free path of the hot neutral atoms if the transport is classical, the magnetic field is higher than 3(1+ sq q) 1/2 T and the plasma density is below 5 x 10 to the 20th power/cu m minus 3 power. Boehm transport allows operation at lower plasma densities. The impurities have no effect on the mantle if the plasma density is above 10 to the 20th power/cu m. Compared to cold gas blanket systems, where the temperature is less than 3 eV, the cool plasma mantle will protect the walls with heat fluxes four times the maximum allowable for gas blankets. The restrictions on the operating regime of the cool

plasma mantle which are due to the impurities apply to the cold gas blanket regime as well. A.R.H.

N81-14866# Royal Inst. of Tech., Stockholm (Sweden). Dept. of Plasma Physics and Fusion Research.
MAGNETOACOUSTIC MODE COUPLING TO EXCITATION STRUCTURES
M. Bures Apr. 1980 43 p refs Sponsored by Euratom
(TRITA-PFU-80-07; ISSN-0348-7644) Avail: NTIS HC A03/MF A01

Coupling calculations of magnetoacoustic modes are presented in slab and transversely magnetized cylindrical geometry. The expressions for loading impedance of the resonance modes, quality factor and coupling coefficient were obtained in both cases. The calculations serve as a model for the INTRAP-devices with poloidal static magnetic field. The influence of the partially ionized mantle at the plasma boundary on coupling efficiency is discussed. The presence of neutral gas lowers the quality factor of M.A. resonance and consequently the antenna efficiency. The selective mode excitation provides the means of coupling enhancement to a specific mode. This might be important in the case of large devices with dense plasmas. Author

N81-14867# Royal Inst. of Tech., Stockholm (Sweden). Dept of Plasma Physics and Fusion Research.
EXPERIMENT ON MAGNETOACOUSTIC MODE EXCITATION IN FIVA DEVICE Research and Training Programme on Controlled Thermonuclear Fusion and Plasma Physics (EUR-NE)
M. Bures and A. Kuthy Apr. 1980 25 p refs
(TRITA-PFU-80-08; ISSN-0348-7644) Avail: NTIS HC A02/MF A01

The magnetoacoustic modes are excited in the FIVA device at low power level. The results are in good agreement with the predictions based on the excitation of the fast magnetoacoustic wave in the transversely magnetized wave-guide. The resonance quality factor, antenna-mode coupling and loading resistance are measured. The results indicate that a substantial part of the power available at the antenna can be deposited in the magnetoacoustic mode. Author

N81-14868# Fom-Instituut voor Plasmafysica, Rijnhuizen (Netherlands).
THE MEASUREMENT OF THE ION ENERGY DISTRIBUTION AND THE HOT ION DENSITY DECAY IN TORTURI
H. J. B. M. Brocken Jan. 1980 31 p refs Sponsored by Ned Organistate voor Zuiver-Wetenschappeelijk Onderzoek and Euratom
(Rept-80-122) Avail: NTIS HC A03/MF A01

In order to measure the ion heating in the turbulently heated tokamak TORTUR I a neutral particle energy analyzer was constructed to perform passive charge exchange measurements. The calibration of this neutral particle energy analyzer is presented. A theory is developed to interpret the results of the charge exchange measurements taking into account the near impermeability of the TORTUR I plasma for neutral particle fluxes. Multi-temperature distribution are introduced. From the measurements it is found that the heating of the ions due to ion-acoustic turbulence gives rise to energetic tails in the ion energy distribution functions. Part of these ions are lost at timescales corresponding the charge exchange processes near the vessel wall. As a consequence of the bombardment of the quartz vessel wall a desorption of neutral hydrogen results which increases the neutral density. This influx of neutral gas and at later times the combination of the diffusion of neutral gas and the current decay, leads to current disruptions obscuring the heat transfer from the energetic tail to, and through, the colder plasma population. M.G.

N81-14869# Massachusetts Inst. of Tech., Cambridge.
THE BALLOONING MODE SECOND STABILITY REGION FOR SEQUENCES OF TOKAMAK EQUILIBRIA
L. Sugiyama and J. W.-K. Mark [1980] 39 p refs Submitted for publication Sponsored by DOE
(DOE/ET-53073/T1) Avail: NTIS HC A03/MF A01

A numerical investigation of several sequences of Tokamak equilibria derived from two flux conserving sequences is discussed which confirms the tendency of high n ideal MHD ballooning modes to stabilize for values of the plasma beta greater than a second critical beta for sufficiently favorable equilibria. The major stabilizing effect of increasing the inverse rotational transform profile psi for equilibria with the same flux surface geometry is shown. The unstable region shifts toward larger shear d in q/d ln r and the width of the region measured in terms of the poloidal beta or a pressure gradient parameter, for fixed shear, decreases. The smaller aspect ratio sequences are more sensitive to changes in q and have less stringent limits on the attainable value of the plasma beta in the high beta stable region. Finally, the disconnected mode approximation is shown to provide a reasonable description of the second high beta stability boundary. M.G.

N81-14870# Martin Marietta Labs., Baltimore, Md.
INVESTIGATION OF SURFACE PLASMON DISPERSION Final Report, 16 Aug. 1977 - 15 Aug. 1980
Wenpeng Chen and Jar-Mo Chen 30 Sep. 1980 129 p refs
(Contract DAAG29-77-C-0036)
(AD-A091853; MML-TR-80-38C; ARO-14543.4-P) Avail: NTIS HC A07/MF A01 CSCL 07/4

The attenuated-total-reflection (ATR) technique was used to study surface plasma wave (SPW) dispersion of Cs- and Cs-O-covered Ag surfaces. Our data indicate that SPW are heavily damped by an adsorbed Cs submonolayer with no obvious change in their wavevectors. However, in the presence of an adsorbed Cs-O submonolayer, SPW show changes in their wavevectors, but without any obvious damping. Based on our theoretical analysis, we have concluded that the Cs-Ag and the Cs-O-Ag surface layers are strongly absorptive and transparent, respectively. The relationship between the SPW damping and Cs coverage indicates that SPW can be damped by a photoelectric effect. A least-squares fit for the ATR data was used to determine the optical constant e + e - ie: and thickness, d, of Ag films thinner than 600 A. We found two sets of e and d from the fitting for each wavelength that can be distinguished by simultaneously fitting data for another wavelength. For a slowly deposited Ag film with mass thickness t smaller than 250 A, we found that, for decreasing t (1) the derived e becomes less negative, (2) e increases dramatically, and (3) the derived effective thickness is about 200 A, which suggests that the Ag films are more likely to be island types with an island height of approximately 200 A. SPW were also used to enhance photoemission signals from a cathode and to enhance the photovoltaic signal from a Si-Au diode. GRA

N81-14871# Westinghouse Electric Corp., Pittsburgh, Pa. Cooperative Graduate Education Program in Fusion Technology.
AN EXPERIMENTAL STUDY OF UNIPOLAR ARCS IN A LOW PRESSURE MERCURY DISCHARGE
Carol T. Johnson (Pittsburgh Univ., Pa.) 31 Dec. 1979 54 p refs
(Contract EG-77-C-02-4231)
(DOE/ET-51010/8; WFPS-TME-79-033) Avail: NTIS HC A04/MF A01

The results were found to be consistent with the concept of a sheath mechanism for driving the unipolar arcs. Floating double probe measurements of the unipolar arc plasma parameters yielded electron temperatures of approximately 2 eV and electron number densities of approximately 1 x 10 to the 11th power per cu cm assuming quasineutral plasma conditions. The variation of the unipolar arc current with the RF power input and the metal surface area exposed to the plasma verified the predicted dependence of the arc current on the plasma parameters and the metal surface area. Finally, alternative mechanisms for sustaining the observed arcs by high frequency, rectification were ruled out on the basis of the recorded current waveforms of the unipolar arcs. Author

N81-14872# Avco-Everett Research Lab., Mass.
FUSION DRIVER STUDY Final Technical Report, 1 Apr. 1978 - 31 Mar. 1980
H. W. Friedman Apr. 1980 338 p
(Contract DE-AC08-78DP-40006)
(DOE/DP-40006/1) Avail: NTIS HC A15/MF A01

A conceptual design of multimegajoule, repetitively pulsed CO2 laser system for Inertial Confinement Fusion is presented. System configurations consisting of 50-100 kJ modules operating

at subatmospheric pressures with multiple pass optical extraction appear feasible with present or near term technology. Overall laser system efficiencies of greater than 10% at repetition rates in excess of 10 Hz are possible with the state of the art pulsed power technology. The synthesis of all the laser subsystems into a specific configuration for a Laser Fusion Driver depends upon the reactor chamber(s) layout, subsystem reliability and restrictions on overall dimensions of the fusion driver. A design is presented which stacks power amplifier modules in series in a large torus with centrally located reactor chamber. Cost estimates of the overall laser fusion driver are included. A.R.H.

N81-14873# Department of Energy, Washington, D. C.
COMPACT TOROID THEORY PLANNING WORKSHOP
Jul. 1980 21 p Workshop held at Germantown, Md., 28-29 May 1980
(DOE/ER-0062) Avail: NTIS HC A02/MF A01

The most important physics issues that need to be addressed in order to assure the optimal design and timely interpretation of Compact Toroid experiments are discussed. The priority problem areas identified were formation and equilibrium, stability, transport, heating, and reactors. Tables identify the high priority areas within these groupings, together with a summary recommendation of levels of effort. S.F.

N81-14874# JAYCOR, Del Mar, Calif.
MICROWAVE HEATING OF THE ELMO BUMPY TORUS RELATIVISTIC ELECTRON RING Status Report, 1 Nov. 1979 - 30 Sep. 1980
S. Hamasaki, H. H. Klein, N. A. Krall, J. B. McBride, and J. L. Sperling Oct. 1980 54 p refs
(Contract DE-AC03-80ER-53092)
(DOE/ER-53092/13) Avail: NTIS HC A04/MF A01

A model for microwave heating of electron rings in the ELMO Bumpy Torus (EBT) configuration is analyzed using a relativistically correct quasilinear formulation. The steady state ring energy and the microwave power required to sustain the rings are determined by balancing the line averaged heating rate against classical collisional and radiative energy loss processes. Electron-cyclotron resonances, especially the first and second, contribute to ring heating at steady state. It is shown that fundamental electron-cyclotron heating by extraordinary waves could account for initial ring formation. The model predicts ring power requirements for EBT-1 which are consistent with previous estimates. Author

N81-14875# Westinghouse Electric Corp., Red Bank, N.J. Advanced Energy Systems Div.
MHD ELECTRODE DEVELOPMENT Quarterly Report, Apr. - Jun. 1980
John W. Sadler, Laurence H. Cadoff, Don L. Dietrick, James A. Dilmore, Edsel W. Frantti, Dave Jacobs, Edgar L. Kochka, Jack A. Kuszyk, S. K. Lau, and Joseph Lempert Jul. 1980 95 p refs
(Contract DE-AC01-79ET-15529)
(DOE/ET-15529/T1) Avail: NTIS HC A05/MF A01

Emphasis is now being directed towards the engineering development of cold metallic electrodes, and in particular the identification and evaluation of alternatives to platinum for use as anodes. A literature search, concentrating on hot corrosion resistant alloys, was undertaken and results are presented. In addition, results of platinum copper diffusion studies and a preliminary evaluation of sputter coated specimens of TiB2 clad copper are reported. Laboratory anode arc erosion studies continued. A number of modifications incorporated in the test setup are described. This modified test arrangement was used to obtain comparative data on a number of potential anode metal alloys. Further work is required to refine the test, particularly to provide a reliable method of applying corrodent to the specimens under test. No significant laboratory electrochemical corrosion tests were completed. Author

N81-14876# United Technologies Research Center, East Hartford, Conn.
PLASMA STABILIZATION EXPERIMENT Final Report, 1 Oct. 1979 - 30 Apr. 1980
Edward A. Sziklas, Walter J. Fader, Raynard A. Jong, and John H. Stufflebeam Jul. 1980 99 p refs
(Contract DE-AC02-79ET-53087)
(DOE/ET-53087/2) Avail: NTIS HC A05/MF A01

The plasma stabilization experiment is an effort to enhance stability in a mirror-confined plasma by trapping cold ions with rf fields applied near the mirror throats. Nagoya Type 3 antennas, coupled to a 60 kW rf power supply are mounted in the throats of the UTRC baseball magnet. An external washer gun provides a source of plasma for both streaming and confined plasma tests. Results show a strong stoppering effect on streaming plasmas and a marginal effect on confined plasmas. Theoretical calculations provide an explanation for the experimental observations. The field generates a ponderomotive force acting on the electrons. The resultant improvement in electron confinement changes the ambipolar potential and inhibits the flow of ions through the mirror throat. Criteria are derived for the validity of this trapping concept. The requisite field strengths are significantly lower than those required to trap ions directly. Scaling laws are developed for application of cold ion trapping to large mirror devices containing dense plasmas. The use of slow-wave antenna structures operated at frequencies above the lower hybrid frequency is recommended for these applications. DOE

N81-14877# College of William and Mary, Williamsburg, Va. Dept. of Physics.
MOST PROBABLE IDEAL MAGNETOHYDRODYNAMIC EQUILIBRIA? 1: TOKAMAK REGIME AND QUASI-FORCE-FREE STATES
John Ambrosiano and George Vahala [1980] 31 p refs Sponsored by DOE
(DOE/ET-53045/1) Avail: NTIS HC A03/MF A01

Given the information on only a few global parameters (e.g., energy E, magnetic helicity H, flux phi, current I,... - constraints that can be either experimentally imposed or constants of the motion...) the statistical theory of Montgomery, Turner and Vahala, which determines the most probable ideal magneto-hydrodynamic equilibrium compatible with the given information, is investigated in the Tokamak regime. It is shown that in this regime of phi dominates I, one obtains typical experimentally relevant profiles e.g., B sub theta is dominated by B sub z, slightly diamagnetic toroidal fields with torodial currents peaked on axis. A sequence of most probable equilibria, with decreasing ratio of E/H at fixed phi and I, is investigated showing less diamagnetic states with rapidly decreasing plasma beta. Linearized analytic force-free states can also be constructed for certain regimes of the global parameters together with their nonlinear quasi-force-free counterparts. Author

N81-14878# College of William and Mary, Williamsburg, Va. Dept. of Physics.
MOST PROBABLE IDEAL MAGNETOHYDRODYNAMIC EQUILIBRIA. 2: REVERSED FIELD PINCH REGIME
John Ambrosiano [1981] 29 p refs Sponsored by DOE
(DOE/ET-53045/2) Avail: NTIS HC A03/MF A01

The statistical theory presented is extended to allow the toroidal field B sub 2(r) to be an arbitrary function of r so as to allow the possibility of reversed field most probable states. It is found that in the reversed field pinch regime, phi is dominated by iota, that decreasing E/H at fixed phi and I leads to a sequence of most probable equilibria with increasing field reversal and hollow pressure profiles on axis - in marked contrast to the corresponding behavior in the Tokamak regime (phi dominates iota) in which B sub 2 becomes a uniform field as E/H decreases. It appears that in both regimes the most probable equilibria are becoming more stable as E/H decreases. DOE

N81-14879# Wisconsin Univ. - Madison.
OBSERVATIONS OF NEOCLASSICAL AND ANOMALOUS RESISTIVITY IN TOROIDAL DISCHARGES
J. F. Etzweiler and D. A. Brouchous Mar. 1980 43 p refs Submitted for publication
(DOE/ET-53051/4; COO-ET53051-4) Avail: NTIS HC A03/MF A01

Plasma resistivity measurements parallel to the magnetic field have been made on the Wisconsin supported octupole and the Wisconsin levitated octupole. Plasmas ranged in density from 10 to the 8th power/cu cm to 10 to the 12th power/cu cm and varied from highly collisionless to highly collisional. The measured resistivity was found to agree with neoclassical resistivity

theory in the collisional and transition regimes. Highly collisionless plasmas were found to have anomalously high resistivity which obeyed the T(e) sup 1/2 /n(e) scaling of the transition regime. DOE

N81-14880# Texas Univ., Austin. Fusion Research Center.
TOKAMAK CURRENTS DRIVEN BY WEAK ELECTROSTATIC WAVES
D. A. Hitchcock and S. M. Mahajan Jul. 1980 10 p refs
Sponsored by DOE
(DOE/ET-53036/18: FRCR-213) Avail: NTIS HC A02/MF A01

The generation of steady state currents by weak electrostatic waves is examined via a perturbation treatment. An exact solution of the first order equation is found. The amount of power required to sustain currents is evaluated. Author

N81-14881# Wisconsin Univ. - Madison. Dept. of Nuclear Engineering.
FUSION REACTOR PHYSICS AND TECHNOLOGY Progress Report, 1 Jul. 1979 - 30 Jul. 1980
G. L. Kulcinski, G. A. Emmert, and C. W. Maynard 1980 45 p refs
(Contract ET-78-S-02-4636)
(DOE/ET-52048/T1) Avail: NTIS HC A03/MF A01

Progress in the design and analysis of a tandem mirror reactor with a thermal barrier is reported. The zero dimensional power balance code which calculates the performance of the TMRs was modified to include the thermal barrier. It is shown that the thermal barrier improves the reactor potential of the tandem and that the addition of ECRH to the barrier to create a population of hot, magnetically trapped electrons improves the performance even further. The magnet system, the blanket and shield design, and results of a preliminary economic analysis are described. J.M.S.

N81-14882# Oak Ridge National Lab., Tenn.
EXPERIMENTS IN THE ISX-B TOKAMAK: ECRH RIPPLE STUDIES, PELLET FUELING, IMPURITY FLOW REVERSAL, AND SURFACE PHYSICS
R. C. Isler, S. L. Milora, D. A. Arnurius, S. C. Bates, K. E. Burrell (General Atomic Co., San Diego, Calif.), C. E. Bush, K. R. Chu (Naval Research Lab., Washington, D.C.), R. E. Clausing, C. E. Crume, and J. L. Dunlap 1980 13 p refs Presented at the 8th Intern. Conf. on Plasma Phys. and Controlled Nucl. Fusion Res., Brussels, 1 Jul. 1980
(Contract W-7405-eng-26)
(IAEA-CN-38/A-5; CONF-800707-22-Draft) Avail: NTIS HC A02/MF A01

The wide variety of experiments on the ISX-B Tokamak includes electron cyclotron heating, ripple effects, hydrogen pellet fueling, impurity flow reversal mechanisms, plasma edge studies, and testing of limiter coatings. The most significant results in each of these areas is discussed. DOE

N81-14883# Battelle Pacific Northwest Labs., Richland, Wash.
PRECONCEPTUAL DESIGN AND ASSESSMENT OF A TOKAMAK HYBRID REACTOR
V. L. Teofilo, B. R. Leonard, Jr., D. T. Aase, W. E. Bickford, N. J. McCormick, R. T. McGrath, J. E. Morrison, R. T. Perry, S. C. Schulte, C. E. Willingham et al Sep. 1980 201 p refs
(Contract DE-AC06-76RL-01830)
(PNL-2720) Avail: NTIS HC A10/MF A01

The preconceptual design of a commercial Tokamak Hybrid Reactor (THR) power plant was performed. The Tokamak fusion driver for this hybrid is operated in the ignition mode. The D-T fusion plasma, which produces 1140 MW of power, has a major radius of 5.4 m and a minor radius of 1.0 m with an elongation of 2.0. Double null poloidal divertors are assumed for impurity control. The confining toroidal field is maintained by D-shaped Nb3Sn superconducting magnets with a maximum field of 12T at the coil. Three blankets with four associated fuel cycle alternatives have been combined with the ignited Tokamak fusion driver. The engineering, material, and balance of plant design requirements for the THR are briefly described. Estimates of the capital, operating and maintenance, and fuel cycle costs were made for the various driver/blanket combinations and an assessment of the market penetrability of hybrid systems is presented. An analysis was made of the nonproliferation aspects of the hybrid and its associated fuel cycles relative to fission reactors. The current and required level of technology for both the fusion and fission components of the hybrid system has been reviewed. Licensing hybrid systems is also considered. DOE

N81-14884# Los Alamos Scientific Lab., N. Mex.
RMF CONCEPT: A ROTATING-MAGNETIC-FIELD TECHNIQUE FOR DRIVING STEADY PLASMA CURRENTS IN COMPACT TOROID DEVICES
Kenneth F. McKenna Sep. 1980 34 p refs
(Contract W-7405-eng-36)
(LA-8516-MS) Avail: NTIS HC A03/MF A01

The generation and/or sustaining of a compact toroid (CT) configuration using the RMF technique is a relatively new and unknown concept. In this report the basic principles, historical development, and current theoretical understanding of this concept are reviewed. Significant experimental and theoretical results, potential problem areas, and recommendations for the direction of future work are discussed. An illustrative analysis of the application of the RMF technique to a CT reactor is presented. The results of a recent experiment, the Rotamak, in which a spheromak-like CT plasma was produced using the RMF technique, are presented. DOE

N81-14885# Oak Ridge National Lab., Tenn. Fusion Energy Div.
INSTRUMENTATION AND CONTROLS OF AN IGNITED TOKAMAK
W. R. Becraft, J. Golzy, W. A. Houlberg, C. A. Kukielka, R. J. Onega, G. V. S. Raju, and R. S. Stone Oct. 1980 136 p refs
(Contract W-7405-eng-26)
(ORNL/TM-7153) Avail: NTIS HC A07/MF A01

The instrumentation and controls of an ignited plasma magnetically confined in a Tokamak configuration needs increased emphasis in the following areas: (1) physics implications for control; (2) plasma shaping/position control; and (3) control to prevent disruptive instabilities. Effort in these and other areas are reported. The appendices focus attention on some preliminary ideas about the measurement of the deuteron-triton ratio in the plasma, synchrotron radiation, and divertor control. DOE

N81-14886# Oak Ridge National Lab., Tenn. Fusion Energy Div.
EQUILIBRIUM FIELD COILS FOR THE ENGINEERING TEST FACILITY: SHAPING THE PLASMA CROSS SECTION
D. J. Strickler and Y-K M. Peng Sep. 1980 29 p refs
(Contract W-7405-eng-26)
(ORNL/TM-7339) Avail: NTIS HC A03/MF A01

Through programming of currents, a relatively simple set of equilibrium field (EF) coils located exterior to the toroidal field (TF) coils will create the external field necessary to fix the plasma shape during different phases of the plasma discharge. The method of coil location is described and applied to a preconceptual ETF/INTOR Tokamak design of 12 TF coils and a poloidal divertor. Free boundary MHD equilibrium calculations using the EF coil configuration show that the position of the separatrix changes by about 10 cm as plasma pressure increases from beta = 0.5% to beta = 5.6%. We have attempted to satisfy the present perception of plasma equilibrium requirements and engineering in ETF and INTOR. DOE

N81-14887# Oak Ridge National Lab., Tenn.
ELECTRON HEATING AND CONFINEMENT MEASUREMENTS IN EBT-S USING THOMPSON SCATTERING
L. Bighel and J. A. Cobble Sep. 1980 29 p refs
(Contract W-7405-eng-26)
(ORNL/TM-7437) Avail: NTIS HC A03/MF A01

Thomson scattering of ruby laser light was used to measure electron temperatures and densities in the ELMO Bumpy Torus Scale at Oak Ridge National Laboratory. The scattering system, which was designed for very low electron density measurements, features a 14 J ruby laser, a high throughout spectrometer, and 15% quantum efficiency photomultipliers. The measured electron densities lie in the range 5 X 10 to the 11th power/cu cm to 2.2 X 10 to the 12th power/cu cm with electron temperatures

from 50 to 500 eV. The radial profiles of T/sub e/ and n/sub e/ are reasonably flat over an 8 cm region from the plasma center outward. The dependence of T/sub e/ and n/sub e/ on microwave power input and on background pressure is discussed. The electron data are used to derive approximate values of the energy confinement time. DOE

N81-14888# Oak Ridge National Lab., Tenn.
CURRENTS INDUCED IN TOKAMAKS BY ELECTRON CYCLOTRON HEATING
O. C. Eldridge Oct. 1980 34 p refs
(Contract W-7405-eng-26)
(ORNL/TM-7503) Avail: NTIS HC A03/MF A01

Generation of a plasma current is predicted in association with strong electron cyclotron heating in Tokamaks or in any plasma with transverse magnetic field gradients. The current predicted in present day Tokamak is of the order of the one-quarter ampere per watt, which is large enough to be detected in heating experiments in progress. The current scales linearly with electron temperature and heating power and inversely with density and major radius. The mechanism depends on the Doppler shift for electrons streaming along magnetic field lines. Electrons streaming toward the source of radiation are resonant at a larger magnetic field. When the interaction is strong, radiation incident from the high field side is absorbed before reaching the cold electron resonant surface, and, so, a unidirectional population of electrons is heated. The anisotropic electron distribution gains momentum by collisions with ions. For small Tokamaks the extraordinary wave should be launched for current drive, but for reactors the ordinary wave produces sufficiently strong interaction. DOE

N81-14889# Princeton Univ., N. J. Plasma Physics Lab.
DISRUPTIVE SHIFT OF MAGNETIC AXIS NONCIRCULAR TOKAMAKS
M. Okabayashi, H. Maeda, H. Takahashi, and M. Reusch Sep. 1980 14 p refs
(Contract DE-AC02-76CH-03073)
(PPPL-1707) Avail: NTIS HC A02/MF A01

The magnitude of magnetic axis shift, following a sudden, disruptive decrease in internal inductance and poloidal beta, can be greatly reduced in non-circular Tokamaks by exploiting the negative decay index of the equilibrium magnetic field. In this sense a noncircular plasma has important advantages over a circular plasma in preventing the catastrophic consequences of major disruptions. A Tokamak design and operational concept is discussed, which exploits these advantages, and is fundamentally different from the traditional approach. DOE

N81-14890# Oak Ridge National Lab., Tenn.
PLASMA PHYSICS OF INTENSE NEUTRAL BEAM HEATING IN TOKAMAKS
J. D. Callen and J. A. Rome 1979 14 p Workshop held in Oak Ridge, Tenn., 25 Apr. - 2 May 1979; sponsored by IAEA
(Contract W-7405-eng-26)
(CONF-790463-2) Avail: NTIS HC A02/MF A01

The major conclusions of the workshop were: 1) neutral beam heating is still an infant and difficult technology; 2) neutral beam heating experiments have just begun to explore the P (sub inj) much greater than P (sub ohmic) regime: 3) no obvious injection-specific limits of neutral beam heating were found for powers up to 2.4 MW in PLT, or up to > or = to 1 MW in the smaller DITE, ISX-B and T 11 experiments; 4) an ever-increasing number of high power injection experiments are planned over the next few years; and 5) the classical, Coulomb-collision based theory of neutral beam injection is in good agreement with experimental results and is presently progressing to a stage which is primarily one of computer code development and experiment evaluation and interpretation. DOE

N81-14891# California Univ., Livermore. Lawrence Livermore Lab. Magnetic Fusion Energy Computer Center.
NUMERICAL SOLUTION OF INITIAL-VALUE PROBLEMS IN PLASMA PHYSICS
John Killeen Oct. 1980 27 p refs Presented at Semester on Computational Math., Warsaw, Spring, 1980
(Contract W-7405-eng-48)
(UCRL-85033) Avail: NTIS HC A03/MF A01

The numerical models used in fusion research are briefly reviewed. The application of implicit difference techniques to problems in resistive magnetohydrodynamics, transport, and the Fokker-Planck equation is discussed. DOE

N81-14892# California Univ., Livermore. Lawrence Livermore Lab.
NATIONAL MIRROR FUSION PROGRAM PLAN
R. R. Borchers, ed. and C. M. VanAtta, ed. Jan. 1980 129 p refs Prepared in cooperation with DOE, Washington, D.C.
(Contract W-7405-eng-48)
(UCAR-10042-80) Avail: NTIS HC A07/MF A01

Experiments are under way in the Tandem Mirror Experiment (TMX) facility at Livermore. Recently this idea was greatly improved by incorporating a new element called the thermal barrier, a concept that promises a higher power gain factor (Q = 10 to 20) with much less demanding neutral beam and magnet technology and a higher fusion power density in the reactor. In addition to the tandem-mirror experiments in TMX, a new attempt will be made in the Beta 2 facility during FY 1980 to create and sustain a field-reversed mirror configuration, which is a different mirror fusion approach that could lead to early commercialization of small reactors. The plan presented here is designed to exploit the results of these and other mirror experiments and theoretical developments toward a variety of applications. The main objective is electric power generation. DOE

N81-14893# California Univ., Livermore. Lawrence Livermore Lab.
TECHNOLOGY OF DIRECT CONVERSION FOR MIRROR REACTOR END-LOSS PLASMA
W. L. Barr and R. W. Moir 7 Oct. 1980 11 p refs Presented at the 4th ANS Topical Meeting on the Technol. of Controlled Nucl. Fusion, King of Prussia, Pa., 14-17 Oct. 1980
(Contract W-7405-eng-48)
(UCRL-84235; CONF-801011-6) Avail: NTIS HC A02/MF A01

Design concepts are presented for plasma direct convertors (PDC) intended primarily for use on the end-loss plasma from tandem-mirror reactors. Recent experimental results confirm most of these design concepts. Both a one-stage and a two-stage PDC were tested in reactor-like conditions using a 100 kV, 6 kW ion beam. In a separate test on the end of the TMX machine, a single stage PDC recovered 79 W for a net efficiency of 50%. Tandem mirror devices are well suited to PDC. The high minimum energy of the end-loss ions, the magnetic expansion outside the mirrors, and the vacuum conditions in the end tanks required by the confined plasma, all preexist. The inclusion of a PDC is therefore a rather small addition. DOE

N81-14894# California Univ., Livermore. Lawrence Livermore Lab.
MODEL FOR ION CONFINEMENT IN A HOT-ELECTRON TANDEM MIRROR ANCHOR
David E. Baldwin 30 Sep. 1980 16 p refs
(Contract W-7405-eng-48)
(UCID-18802) Avail: NTIS HC A02/MF A01

Anisotropic, hot electrons trapped in local minimum-B wells were proposed as MHD-stabilizing anchors to an otherwise axisymmetric tandem configuration. A model for plasma confinement between the anchors and the remainder of the system is described. The power loss implied by maintenance of this plasma is calculated. DOE

N81-14895# Wisconsin Univ. - Madison. Plasma Physics Group.
STABILITY ANALYSIS OF CYLINDRICAL VLASOV EQUILIBRIA Ph.D. Thesis
Robert W. Short 1979 224 p refs Supported in part by NSF
(DOE/ET-53051/113; COO-2387-113; PLP-810) Avail: NTIS HC A10/MF A01

A general method of stability analysis is discussed which may be applied to the class of problems which are described dynamically by the Vlasov equation, and geometrically by cylindrical symmetry. The method for the simple case of the Vlasov-Poisson (electrostatic) equations is presented, and the results are applied to a calculation of the lower-hybrid-drift

instability in a plasma with a rigid rotor distribution function. The method is extended to the full Vlasov-Maxwell (electromagnetic) equations, and these results are applied to a calculation of the instability of the extraordinary electromagnetic mode in a relativistic E-layer interacting with a background plasma. The method of carrying out the integration of the perturbed distribution function over phase space is emphasized. M.G.

N81-14952*# Rice Univ., Houston, Tex.
TEBPP: THEORETICAL AND EXPERIMENTAL STUDY OF BEAM-PLASMA-PHYSICS
Hugh R. Anderson, William Bernstein, Lewis M. Linson, K. Papadopoulos, Paul J. Kellogg, Edward P. Szuszczewicz, Thomas J. Hallinan, and Harold Leinbach *In* NASA. Marshall Space Flight Center Space Plasma Phys. Active Expt. Oct. 1980 p 117-138 refs (For primary document see N81-14944 05-99)
Avail: NTIS HC A11/MF A01 CSCL 20I

N81-14953*# TRW Defense and Space Systems Group, Redondo Beach, Calif. Systems Group Research Staff.
WAVES IN SPACE PLASMAS (WISP)
R. W. Fredericks *In* NASA. Marshall Space Flight Center Space Plasma Phys. Active Expt. Oct. 1980 p 139-170 refs (For primary document see N81-14944 05-99)
(WISP-336; WISP-80) Avail: NTIS HC A11/MF A01 CSCL 20I

N81-14956*# Iowa Univ., Iowa City. Dept. of Physics and Astronomy.
A RECOVERABLE PLASMA DIAGNOSTICS PACKAGE (RPDP) FOR SPACELAB
Stanley D. Shawhan, K. L. Ackerson, R. R. Anderson, J. D. Craven, N. Dangelo, L. A. Frank, D. A. Gurnett, R. R. Shaw, L. P. Block (Royal Inst. of Technology, Stockholm), and C.-G. Falthammar (Royal Inst. of Technology, Stockholm) *In* NASA. Marshall Space Flight Center Space Plasma Phys. Active Expt. Oct. 1980 p 213-236 refs (For primary document see N81-14944 05-99)
Avail: NTIS HC A11/MF A01 CSCL 20I

76 SOLID-STATE PHYSICS

Includes superconductivity.

For related information, see also *33 Electronics and Electrical Engineering* and *36 Lasers and Masers*.

N81-14896 Northwestern Univ., Evanston, Ill.
MICROSCOPIC THEORY OF DYNAMICAL CORRELATIONS IN THE METALLIC ELECTRON LIQUID Ph.D. Thesis
Padmanbhan Krishna Aravind 1980 237 p
Avail: Univ. Microfilms Order No. 8026760

A microscopic theory is developed of the dynamical correlations in an interacting electron gas at metallic densities. The framework of the jellium model is utilized and the theoretical approaches are provided by diagrammatic perturbation theory and the exact hierarchy of quantum kinetic equations for the Wigner distribution functions of an electron liquid is evaluated. Using perturbation theory, the proper polarization propagator is evaluated exactly to first order in interparticle potential. In the kinetic equation approach, by suitably truncating the equation of motion for the 2 particle distribution function, an expression for the proper polarization propagator is obtained as the sum of the Lindhard (RPA) function and a nonperturbative correction term. This expression is shown to reduce, in a suitable limit, to the perturbation expression calculated earlier. The proper polarization propagator is evaluated explicitly in the limit of long wavelength and used to calculated the dispersion and damping of the long wavelength plasmon. Finally, polarization propagator for arbitrary Q and omega is evaluated. Dissert. Abstr.

N81-14897# AEG-Telefunken, Heilbronn (West Germany). Gescharftsberetch Halbleiter.
ADVANCED ION IMPLANTATION TECHNIQUES Final Report
Arno Kostka and Wilfried Quast Bonn Bundesministerium fuer Forschung und Technologie Oct. 1979 72 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-79-37; ISSN-0340-7608) Avail: NTIS HC A04/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 14,70

Three different applications of the ion implantation technique were developed and checked for their production compatibility. The implantation of gold ions into the back of diode wafers allowed a precise control of reverse recovery times, which was better by at least a factor of 2 compared with the conventional process. By implanting boron ions into the region near the surface of pnp transistors, the effects caused by inversion of the collector zone was successfully suppressed. Using the lateral component during diffusion from implanted sources HF field effect transistors were fabricated with channel lengths of about 2 microns. Measurements of the scattering parameters show that cut off frequencies of more than 1 GHz are possible. Author

N81-14898# Siemens A.G., Munich (West Germany). Gemeinsame Entwicklung Halbeiter.
HOMOGENEOUS PHOSPHORUS OF SILICON BY NEUTRON TRANSMUTATION Final Report
Heinz Mitlehner, Manfred Schnoeller, and Peter Voss Bonn Bunderministerium fuer Forschung und Technologie Nov. 1979 73 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-79-52; ISSN-0340-7608) Avail: NTIS HC A04/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 14,90

Neutron irradiation was developed as a means to homogeneously dope silicon with phosphorus on an industrial scale. Special attention was given to the selection of suitable reactor positions, the annealing of the irradiation damage, and the electrical properties of the devices. The experience with the application of neutron irradiated silicon for a wide spectrum of devices shows that expected homogeneity and aiming accuracy with respect to the doping can be reached with high reliability. R.C.T.

N81-14899# Rockwell International Corp., Thousand Oaks, Calif.
GROWTH OF HgCdTe BY MODIFIED MOLECULAR BEAM EPITAXY Semiannual Technical Report, 1 Mar. - 31 Aug. 1980
J. T. Cheung Oct. 1980 37 p refs
(Contract MDA903-79-C-0188; ARPA Order 3704)
(AD-A091822; SC5202.9SA; SATR-3) Avail: NTIS HC A03/MF A01 CSCL 07/4

HgCdTe thin films were deposited and annealed by laser radiation. The evaporants were analyzed by mass spectroscopy and their chemical compositions were found to depend on the laser scanning rate. The interaction of a short (10 to the minus 7 sec) laser pulse with a crystalline HgCdTe surface was studied. Threshold values for inducing evaporation were determined to be 6 x 10 to the 7th power w/cm square centimeters and 2 x 10 to the 7th power w/cm square centimeters, respectively. GRA

N81-14900# Northwestern Univ., Evanston, Ill. Dept. of Chemistry.
STRATEGIES FOR CONTROL OF LATTICE ARCHITECTURE IN LOW-DIMENSIONAL MOLECULAR METALS: ASSEMBLY OF PARTIALLY OXIDIZED FACE-TO-FACE LINKED ARRAYS OF METALLOMACROCYCLES
C. W. Dirk, E. A. Mintz, K. F. Schoch, Jr., and Tobin J. Marks 6 Oct. 1980 33 p refs Submitted for publication
(Contract N00014-77-C-0231; NSF DMR-76-80847)
(AD-A091535; TR-14) Avail: NTIS HC A03/MF A01 CSCL 20/2

This paper discusses an approach to control molecular stacking interactions in low dimensional mixed valence materials by locking partially oxidized metallomacryocycles together in a face-to-face orientation. Thus, doping of the cofacially linked oligomers with halogen (I2, Br2) or quinone (e.g., TCNQ, DDQ) electron acceptors produces robust, electrically conductive polymers with a wide range of stoichiometries and properties. The new materials have been studied by a variety of physical methods including X-ray diffraction, resonance Raman and infrared spectroscopy, ESR, static magnetic susceptibility, and variable-temperature four-probe

electrical conductivity. Evidence is presented that some of the polymers have metal-like conductivity in the stacking direction and that transport properties within the series can be readily manipulated by rational variation of lattice architecture (e.g., the identity of the metal, M) and acceptor characteristics. Additional information is presented on doping experiments with electron donors and on employing metallohemiporphyrazines as polymer building blocks. GRA

N81-14901# Sandia Labs., Albuquerque, N. Mex.
ELECTROCHEMICAL AND SURFACE ANALYSIS OF THE REACTIVE INTERFACES IN THE Li(Si)FeS2 PRIMARY BATTERY
Rod K. Quinn, Dale E. Zurawski, and Neal R. Armstrong (Arizona University, Tucson) 1980 31 p refs
(Contract DE-AC04-76DP-00789)
(SAND-79-2155C; CONF-800917-3) Avail: NTIS HC A03/MF A01

Compositional changes in the anode, electrolyte, and cathode regions of the Li(Si)/LiCl, KCl/FeS2 battery system were examined. Results of studies by scanning electron and photomicroscopy; electron microprobe analysis, and Auger electron spectroscopy of the anode/electrolyte binder interface and the cathode/electrolyte binder interface are presented. Analyses of single cell discharges, where current density, temperature and time can be controlled, show significant migration of sulfur, iron, and silicon. This migration apparently results in a concentration of sulfur and iron in a well defined, narrow region approximately in the center of the electrolyte. A mechanism for this observation is proposed. DOE

N81-14902# New Mexico Inst. of Mining and Technology, Socorro. Dept. of Metallurgical and Materials Engineering.
CHARACTERIZATION OF EXTRINSIC GRAIN BOUNDARY DISLOCATIONS AND GRAIN BOUNDARY DISLOCATION SOURCES BY TRANSMISSION ELECTRON MICROSCOPY Annual Report
L. E. Murr Apr. 1980 14 p refs
(Contract DE-FG04-79AL-10887)
(DOE/AL-10887; AR-1) Avail: NTIS HC A02/MF A01

Preliminary experiments of grain boundaries, grain boundary ledges, and the apparent emission of dislocations from grain boundary ledges, as part of an attempt to directly observe the emission of dislocations from grain boundary ledge sources in-situ by high-voltage transmission electron microscopy are presented. Observations of grain boundary ledges and dislocation emission profiles in strained sheets of 304 stainless steel are described. Preliminary results indicate that the number of dislocation profiles per unit length of grain boundary are related to the engineering strain, as are the mean profile lengths. In addition, ledge density increase with increasing strain, and grain structure changes with increasing strain. Many applications, of grain boundary phenomena to technical areas are described in the appendices, along with other results related to the mechanical properties associated with grain boundaries and grain boundary structures, as well as other deformation microstructures in polycrystalline metal and alloys. Author

N81-14903# Arizona State Univ., Tempe. Dept. of Physics.
IMAGING OF SURFACES AND DEFECTS OF CRYSTALS Progress Report, 1 May 1979 - 31 May 1980
J. M. Cowley Jun. 1980 17 p refs
(Contract DE-AC02-76ER-02995)
(DOE/ER-02995/4) Avail: NTIS HC A02/MF A01

Studies on the oxidation of chromium and chromium iron alloys and on the surface structure of magnesium oxide and related materials are presented. Microdiffraction from regions 10-20 A in diameter has allowed clarification of the nature and epitaxial relationships of the very thin oxide layers formed when chromium films are heated. The new observations include the existence of a uniform thin layer of a previously undetected spinel structure phase. Deductions were made on the factors influencing growth of the oxide layers. The development of techniques for the study of surfaces by reflection diffraction imaging allowed the visualization of growth steps only 2-5 A high on the surfaces of MgO smoke particles. The observation of interference fringe in defocussed images of small crystals promises to provide sensitive methods for study of the variations of potential at crystal surfaces. Remodelling of the medium energy electron diffraction and microscopy system should allow greatly improved performance for surface studies. S.F.

N81-14904# Massachusetts Inst. of Tech., Cambridge. Dept. of Materials Science and Engineering.
MECHANISM FOR DIFFUSION INDUCED GRAIN BOUNDARY MIGRATION
R. W. Balluffi and J. W. Cahn (NBS, Washington, D.C.) Aug. 1980 28 p refs
(Contract DE-AS02-78ER-05002)
(DOE/ER-05002/13) Avail: NTIS HC A03/MF A01

Grain boundaries are found to migrate under certain conditions when solute atoms are diffused along them. This phenomenon, termed diffusion induced grain boundary migration, is found in six systems. The observed phenomenon and empirical data are used to discard certain concepts for the driving force and the mechanism. A mechanism is proposed in which differences in the diffusion coefficients of the diffusing species along the grain boundary cause a self sustaining climb of grain boundary dislocations and motion of their associated grain boundary steps. Author

N81-14905# Massachusetts Inst. of Tech., Cambridge. Dept. of Materials Science and Engineering.
KINETIC PROCESSES AT GRAIN BOUNDARIES Progress Report, 15 Aug. 1979 - 14 Aug. 1980
R. W. Balluffi May 1980 24 p refs
(Contract DE-AS02-78ER-05002)
(DOE/ER-05002/11) Avail: NTIS HC A02/MF A01

The objective of the present research was a broad investigation of kinetic processes at grain boundaries and the relationship between those kinetic processes and the boundary structure. The approach was both experimental and theoretical. Extensive use was made of high resolution experimental methods of investigating grain boundaries in specimens containing boundaries of controlled geometry. Computer simulation was also employed. Elements of the following projects were completed: (1) a study of intrinsic and extrinsic secondary grain boundary dislocation structure in high angle twist boundaries in MgO; (2) a study of grain boundary dislocation in plane matching grain boundaries; (3) an analysis and review of high angle grain boundaries as sources or sinks for point defects; (4) an analysis and review of grain boundary structure in metals and ceramic oxides; (5) simulation of the structure vacancies in high angle grain boundaries. Progress was made in the following areas; (6) development of a model for diffusion induced grain boundary migration; and (7) determination of the mechanism for grain boundary diffusion in metals. Author

77 THERMODYNAMICS AND STATISTICAL PHYSICS

Includes quantum mechanics; and Bose and Fermi statistics.

For related information see also *25 Inorganic and Physical Chemistry* and *34 Fluid Mechanics and Heat Transfer.*

N81-14906# National Bureau of Standards, Washington, D.C.
RELEVANCE OF THE SECOND LAW OF THERMODYNAMICS TO ENERGY CONSERVATION, VOLUME 2
Jan. 1980 275 p refs Sponsored in part by DOE
(DOE/CS-40178/1-Vol-2) Avail: NTIS HC A12/MF A01

The 2nd law of thermodynamics (and the entropy concept) distinguishes a grade or quality of the energy being considered as well as quantity. From this distinction flow two important considerations: the losses at each point in a system can be assessed and measured in units that are directly proportional to input or purchased fuel energy; and the minimum energy required to perform a given function or process is ascertainable as well as the maximum energy available from a given source. The explicit use of 2nd law concepts is examined for: (1) energy monitoring; (2) process and system design and modification; (3) component design and modification. The use of the law in evaluating

industrial processes, transportation systems, energy conversion systems, and HVAC systems is discussed as well as the design of heat exchangers, petroleum heaters, multieffect evapotrators, and distillation equipment. Particular emphasis is given to the Kraft process, production of ethylene, the manufacture of Portland cement, the melting and casting of aluminum, and the determining of automobile efficiency. A.R.H.

N81-14907# Ohio State Univ., Columbus. Dept. of Physics.
SEPARABILITY OF CENTER OF MASS AND RELATIVE MOTION OF HYDROGEN IN VERY STRONG MAGNETIC FIELDS
William F. Palmer and Robert J. Taylor 1980 24 p refs
(DOE/ER-01545/284) Avail: NTIS HC A02/MF A01

While hydrogen does not strictly separate into center of mass and relative motion in a magnetic field, a judicious gauge choice does lead to a simple Hamiltonian whose form in a state of zero translational motion of the center of mass is that of a charged particle in a magnetic field plus a coulomb potential. Author

N81-14908# New York Univ., N. Y. Mathematics and Computing Lab.
A RANDOM CHOICE FINITE-DIFFERENCE SCHEME FOR HYPERBOLIC CONSERVATION LAWS
Amiram Harten and Peter D. Lax May 1980 61 p refs
(Contracts NCA-2-OR-525-901; NAS1-14101; DE-AC02-76BR-03077)
(DOE/ER-03077/167) Avail: NTIS HC A04/MF A01

A semianalytical random choice method for calculating discontinuous solutions of hyperbolic systems of conservation laws is modified by replacing the exact solution of the Riemann problem with an appropriate finite difference approximation. The modification resolves discontinuities but is computationally more efficient and is easier to extend to more general situations. M.G.

N81-14909# Texas Univ. at Austin. Center for Particle Theory.
A NOTE ON ZENO'S PARADOX IN QUANTOM THEORY
K. Kraus Feb. 1980 20 p refs Sponsored by DOE and Deutsche Forschungsgemeinschaft
(DOE/ER-03992/387) Avail: NTIS HC A02/MF A01

An argument favoring the credibility of Zeno's paradox in quantum theory is presented. The paradox states that a decaying quantum system, if observed very frequently in order to ascertain whether or not it is still undecayed, will not decay at all. The derivation of this can be criticized by arguing that measurements performed in a very short time interval delta T produce states with a very large energy uncertainty delta E, and that Zeno's paradox disappears if this is taken into account. An explicit counterexample is constructed which proves, that there is no energy-time uncertainty relation of the required kind; therefore the criticism mentioned is unjustified. M.G.

N81-14910# Exxon Nuclear Idaho Co., Inc., Idaho Falls.
HEAT TRANSFER MODELING FOR A NON-FLUIDIZED PARTICULATE BED
James A. Pryatel Sep. 1980 45 p refs
(Contract DE-AC07-79ID-01675)
(EGG/ENI-143) Avail: NTIS HC A03/MF A01

A non-fluidized particulate bed was studied by adapting state of the art computer codes to traditional mathematical models. The bed consisted of uranium dioxide bearing solids which generate decay heat and are immersed in a water based liquid. The ultimate problem was to determine the possibility of realizing fluid vaporization within the bed due to internal heat generation. Heat transfer through the bed was simulated through mathematically modeling particle to particle and particle to void to particle conduction, followed by fine tuning through empirical data supplied by other. The mathematical model and boundary conditions were entered into EG and G Idaho's computer codes INGEN/MOD1 and TRIPLE/MOD1 to obtain bed temperature profiles. A subroutine of TRIPLE/MOD1 was adapted to account for heat of transition energies. The data showed the bed to be conduction sensitive, and, as might be expected, phase change energies dominated heat capacity effects in resisting boiling. In the case studies, significant periods lapsed before boiling could be seen in the bed, a result which could be capitalized on during process operations. DOE

N81-14911# California Univ., Livermore. Lawrence Livermore Lab.
EFFECTS OF DIMENSIONALITY AND BOUNDARY CONDITIONS ON THERMAL CALCUATIONS
Lewis Thorson and Donald N. Montan 29 Sep. 1980 19 p refs
(Contract W-7405-eng-48)
(UCID-18681) Avail: NTIS HC A02/MF A01

Several aspects of the thermal modeling of an underground nuclear waste repository are considered. These are the long term temperature response due to different ground surface boundary conditions, the effects of treating the three dimensional problem in 2D, and the consequences of using a constant power load rather than decaying power typical of radioactive waste. DOE

N81-14912# Brown Univ., Providence, R. I. Dept. of Physics.
A RESEARCH PROGRAM IN THEORETICAL HIGH-ENERGY PHYSICS Progress Report, 1 Jan. - 31 Dec. 1980
David Feldman, Herbert M. Fried, Gerals S. Guralnik, Antal Jevicki, Kyungsik Kang, and Chung-I Tan 1 Oct. 1980 19 p refs
(Contract DE-AC02-76ER-03130)
(COO-3130TA-352; Brown-HET-437) Avail: NTIS HC A02/MF A01

Results are reported in several fields including large-N expansions in quantum field theories via an effective Hamiltonian technique, and by the method of classical field equations supplemented by quantum boundary conditions; finite lattice QCD at N sub c = infinity; neutrino oscillations and natural flavor conservation in gauge theory; the vanishing of the renormalized effective potential in phi sub 4(4) theory; a method for treating singular differential equations; and an infrared cluster expansion in quantum field theory. In addition, the analyses of lattice gauge theories; studies of factorization properties of mass and infrared singularities in QCD; non-hermitian quantum problems in the context of Gribov field theories; symmetry breaking via contracted groups; the calculation of Cabibbo-type angles and grand unification theories; and strong-coupling methods in gauge and nongauge field theories, using a systematic, lattice formulated, perturbation theory, and by the extraction of relevant infrared structure are briefly discussed. DOE

N81-14913# National Bureau of Standards, Washington, D.C. National Engineering Lab.
A REPORT ON THE RELEVANCE OF THE SECOND LAW OF THERMODYNAMICS TO ENERGY CONSERVATION Final Report
David Didion, David Garvin, and Jack Snell Aug. 1980 56 p refs Sponsored in part by DOE
(PB80-216914; NBS-TN-1115) Avail: NTIS HC A04/MF A01 CSCL 10A

The concept of energy efficiency as being the ratio of the minimum available work necessary for accomplishing a given task to the available work in the actual fuel used to accomplish this task is explored in terms of its relevance to federal energy conservation programs. Included is a review of selected elements of thermodynamics and efficiency concepts, and identification of the technology pertinent to energy conservation programs. The potential benefits, if any, that would accrue from the application of Second Law to Thermodynamics principles to these technologies are examined. Needs for advancing the acceptance and use of the Second Law analytical techniques are identified. GRA

80 SOCIAL SCIENCES (GENERAL)

Includes educational matters.

N81-14914*# Santa Clara Univ., Calif.
ADVANCED AUTOMATION FOR SPACE MISSIONS: TECHNICAL SUMMARY Final Report
15 Sep. 1980 87 p refs Original contains color illustrations
(Grant NGR-05-017-998)
(NASA-CR-163827) Avail: NTIS HC A05/MF A01 CSCL 05I

Several representative missions which would require extensive applications of machine intelligence were identified and analyzed. The technologies which must be developed to accomplish these types of missions are discussed. These technologies include man-machine communication, space manufacturing, teleoperators, and robot systems. T.M.

81 ADMINISTRATION AND MANAGEMENT

Includes management planning and research.

N81-14915*# National Aeronautics and Space Administration, Washington, D. C.
STANDARD SPACECRAFT PROCUREMENT ANALYSIS: A CASE STUDY IN NASA-DOD COORDINATION IN SPACE PROGRAMS Ph.D. Thesis - Rand Graduate Inst.
Elwyn D. Harris May 1980 224 p refs Prepared in cooperation with Rand Corp., Santa Monica, Calif.
(R-2619-RC; LC-80-18874; ISBN-0-8330-0248-1) Avail: NTIS HC A10/MF A01 CSCL 05A

The Space Test Program Standard Satellite (STPSS), a design proposed by the Air Force, and two NASA candidates, the Applications Explorer Mission spacecraft (AEM) and the Multimission Modular Spacecraft (MMS), were considered during the first phase. During the second phase, a fourth candidate was introduced, a larger, more capable AEM (L-AEM), configured by the Boeing Company under NASA sponsorship to meet the specifications jointly agreed upon by NASA and the Air Force. Total program costs for a variety of procurement options, each of which is capable of performing all of the Air Force Space Test Program missions during the 1980-1990 time period, were used as the principal measure for distinguishing among procurement options. Program cost does not provide a basis for choosing among the AEM, STPSS, and MMS spacecraft, given their present designs. The availability of the L-AEM spacecraft, or some very similar design, would provide a basis for minimizing the cost of the Air Force Space Test Program. Author

N81-14916# Carnegie-Mellon Univ., Pittsburgh, Pa. Management Science Research Group.
THE SOLUTION OF MANPOWER PLANNING PROBLEMS BY THE FORWARD SIMPLEX METHOD
Jay E. Aronson (Southern Methodist Univ., Dallas) and Gerald L. Thompson Aug. 1980 20 p refs
(Contract N00014-75-C-0621)
(AD-A091521; MSRR-463; WP-3-80-81) Avail: NTIS HC A02/MF A01 CSCL 12/1

The use of the forward simplex algorithm of Aronson, Morton, and Thompson to solve the multi-stage personnel planning linear programming models of Charnes, Cooper, and Niehaus is described. Computational Results on randomly generated problems having up to 200 periods indicate that the forward simplex method requires CPU time and number of pivots which are linear in the number of periods. The standard simplex method requirements vary with at least the cube of the number of periods. For this reason the forward simplex method should be especially useful for solving real time, conversational versions of personnel (and other) planning models. GRA

N81-14917# Department of Energy, Washington, D. C. Office of the Controller.
COST AND SCHEDULE CONTROL SYSTEMS CRITERIA FOR CONTRACT PERFORMANCE MEASUREMENT: IMPLEMENTATION GUIDE
May 1980 109 p
(DOE/CR-0015) Avail: NTIS HC A06/MF A01

The DOE Cost and Schedule Control System System Criteria for Contract Performance Measurement provides DOE and its contractors uniform guidance for CSCSC implementation in compliance with DOE Order 2250.1. Implementation refers to the application of the CSCSC to specific contracts, the assessment of contractor's management systems for compliance with the requirement, and subsequent DOE systems validation or acceptance verifying the contractor's compliance. Any supplemental instructions by individual DOE organizations is consistent with the DOE Order and with this and other CSCSC guidance documents. S.F.

82 DOCUMENTATION AND INFORMATION SCIENCE

Includes information storage and retrieval technology; micrography; and library science.

For computer documentation see *61 Computer Programming and Software*.

N81-14918# VDI-Technologiezentrum, Berlin (West Germany).
DOCUMENTATION OF AND INFORMATION ON PROTECTIVE RIGHTS RELATING TO GOVERNMENT SUPPORT ON TECHNOLOGICAL RESEARCH AND DEVELOPMENT Final Report
Irmgard Gretscher Bonn Bundesministerium fuer Forschung und Technologie Dec. 1979 243 p In GERMAN; ENGLISH summary Sponsored by Bundesministerium Forschung und Technologie
(BMFT-FB-T-79-186; ISSN-0340-7608) Avail: NTIS HC A11/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 50,85

The support programs relating to research include the categories electronics, metallugical process techniques and material technology, nonnucler energy techniques, physical technologies, and technical communication. The present compilation contains those applications filed in 1976 and 1977. The protective rights are described together with complete data, characterzing keywords, and brief descriptive abstracts in order to allow documentation and information. T.M.

N81-14919# Central Electricity Generating Board, Southampton (England). Marchwood Engineering Lab.
IMPROVEMENTS IN THE DIGITIZING OF ANALOGUE INFORMATION
C. E. Fernando London Jan. 1980 31 p
(TDB-343; ISSN-0374-2784) Avail: NTIS HC A03/MF A01

A high speed waveform was digitized. A prediction of the expected value of the analogue input signal was made using previously stored data, and this predicted value was then compared in analogue form with the incoming signal to determine an error signal which was then digitized. The error signal requires far fewer levels of data storage than the analogue signal being sampled and it thus becomes economically possible to store the relevant data in digital form, permitting subsequent reconstruction of the actual magnitudes of the incoming data at the sampling times. T.M.

N81-14920# Wharton (E. F. A.), Inc., Philadelphia, Pa. Dept. of Decision Sciences.
THE FLAT-FILE ALERTER SYSTEM
Rishiyur Nikhil Jul. 1980 20 p
(Contract N00004-75-C-0440; NR Proj. 049-360)
(AD-A091842; Rept-80-07-04) Avail: NTIS HC A02/MF A01 CSCL 09/4

The flat-file alerter system allows one to monitor a flat file for various conditions of interest. A flat file is a sequential file of fixed-length records of identical format. In addition, the file is keyed on a specific field, and sorted on that key. Thus the addition of records (appearance of records with keys that did not exist before), deletion of records (disappearance of keys that existed before), and modification of records (modification of a field other than the key in a record) can be surveyed. GRA

N81-14921# Science Applications, Inc., McLean, Va.
REQUIREMENTS FOR AN HISTORICAL STRATIFICATION FILE USING STD AND CTD DATA
E. J. Molinelli and A. D. Kirwan 27 Jun. 1980 102 p refs
(Contract N00014-79-C-0906)
(AD-A091864; SAI-81-179-WA; OSD-TR-80-202-01) Avail: NTIS HC A06/MF A01 CSCL 08/10

The National Oceanographic Data Center (NODC) has an

obligation to archive stratification data. This task involves coping with modern electronic STD and CTD measurements. The details of performing the modern measurements are examined, and the means by which NODC may cope with them are described in this report. This report constitutes a preliminary step in defining a new system to automatically accept, store and disseminate STD/CTD data. GRA

N81-14922# Science Applications, Inc., McLean, Va.
SPECIFICATIONS FOR AN STD/CTD SYSTEM AT THE NODC
E. J. Molinelli and R. Stieglitz 27 Jun. 1980 143 p
(Contract N00014-79-C-0906)
(AD-A091866; SAI-81-195-WA; OPD-TR-80-202-02) Avail: NTIS HC A07/MF A01 CSCL 08/10

The National Oceanographic Data Center (NODC) has an obligation to archive stratification data including the modern measurements made by electronic STDs and CTDs. In a companion report (Molinelli and Kirwan, 1980) the information requirements on an STD/CTD system are determined. In this report, NODC's present system is evaluated in terms of its ability to handle the required information and in terms of the cost, speed and simplicity of the system:s operation. These items are presented in Section 2. Specific improvements to the system are recommended in Section 3. Appendices are included which give more details than are presented in the text of this report. GRA

N81-14923# Naval Training Equipment Center, Orlando, Fla. Advanced Simulation Concepts Lab.
SURVEY OF CIG DATA BASE GENERATION FROM IMAGERY Interim Technical Report, 10 Oct. 1978 - 31 Dec. 1979
Denis R. Breglia Sep. 1980 82 p refs
(AD-A091508; NAVTRAEQUIPC-IH-318) Avail: NTIS HC A05/MF A01 CSCL 05/8

The generation of an environment model for a Computer Image Generation (CIG) system is currently a labor intensive, expansive effort. This report reviews an extensive amount of literature covering the topics of scene complexity requirements in a visual simulation system, the structure of the data required by existing three dimensional graphic algorithms, the application of photogrammetric and digital image processing techniques to assist the modeler, and recommendations for a modeling facility. GRA

N81-14924# Lincoln Lab., Mass. Inst. of Tech., Lexington.
DESIGN AND DEVELOPMENT OF A SEISMIC DATA CENTER
Michael A. Chinnery and Alvin G. Gann 11 Aug. 1980 48 p
(Contract F19628-80-C-0002; ARPA Order 512)
(AD-A091621; TN-1980-39) Avail: NTIS HC A03/MF A01 CSCL 08/11

The U.S. has embarked on the design and development of a sophisticated data center for the analysis and management of seismic data. There are two broad motivations for this project. First, we need to develop a new generation system for the management and retrieval of digital seismic data, and to provide a modern data resource for the research community. Second, we need a facility that will be able to respond to any U.S. obligations that might be incurred under future agreements on international seismic data exchange and global seismic monitoring, such as those currently under discussion by the Committee on Disarmament. A computer architecture has been selected, consisting of a series of minicomputers connected by a high data rate local computer network. The principal components of the system are discussed, with emphasis on the data base management system, and the seismic analysis station, which provides an interactive man-machine interface. GRA

N81-14925# Oak Ridge National Lab., Tenn. Energy Div.
REFINEMENTS TO THE BOOLEAN APPROACH TO AUTOMATIC DATA EDITING
G. E. Liepins Sep. 1980 42 p refs
(Contract W-7405-eng-26)
(ORNL/TM-7156) Avail: NTIS HC A03/MF A01

Automatic data editing consists of three components: identification of erroneous records, identification of most likely erroneous fields within an erroneous record (fields to impute), and assignment of acceptable values to failing records. Moreover, the types of data considered naturally fall into three categories: coded (categorical) data, continuous data, and mixed data (both coded and continuous). For the case of coded data, a natural way to approach automatic data is commonly referred to as the Boolean approach. For the fields to impute problem, central to the operation of the Fellegi-Holt approach is the explicit recognition of certain implied edits. An algorithm that significantly prunes the Fellegi-Holt edit generation process, yet, nonetheless, generates a sufficient collection of implied edits adequate for the solution of the fields to impute problem is presented. DOE

83 ECONOMICS AND COST ANALYSIS

Includes cost effectiveness studies.

No abstracts in this category.

84 LAW AND POLITICAL SCIENCE

Includes space law; international law; international cooperation; and patent policy.

N81-14926# Committee on Appropriations (U. S. Senate).
DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT, AND CERTAIN INDEPENDENT AGENCIES APPROPRIATIONS, FISCAL YEAR 1981, PART 2
Washington GPO 1980 1298 p Hearings on H. R. 7631 before the Comm. on Appropriations 96th Congr., 2nd Sess., 2-3, 18, 24 Apr. and 1-2, 15-16 May 1980
(GPO-62-143) Avail: SOD HC

Testimony delivered in support of 1981 budget requests are presented for the National Commission on Air Quality, the American Battle Monuments Commission, cemeterial expenses of the Department of the Army, the Federal Home Loan Bank Board, National Institute of Building Sciences, the Federal Emergency Management Agency, the National Aeronautics and Space Administration, the Department of Housing and Urban Development and the Department of the Treasury's Office of Revenue Sharing. The $5.5 billion request for NASA is examined with regard to the President's anti-inflation policy and with emphasis on the cost and performance of space shuttle in comparison to expendables. The impact on the space science program of a $39.8 million reduction in appropriations, the status of the thematic mapper and LANDSAT satellites, and the possibility of private sector operation of remote sensing activities are considered. A.R.H.

85 URBAN TECHNOLOGY AND TRANSPORTATION

Includes applications of space technology to urban problems; technology transfer; technology assessment; and surface and mass transportation.

For related information see *03 Air Transportation and Safety*, *16 Space Transportation*, and *44 Energy Production and Conversion*.

N81-14927# Sandia Labs., Albuquerque, N. Mex. Seabed Programs Div.
THE STRATEGY FOR ASSESSING THE TECHNICAL, ENVIRONMENTAL, AND ENGINEERING FEASIBILITY OF SUBSEABED DISPOSAL
D. Richard Anderson, Daniel M. Talbert, David Reese (Harvard University, Cambridge, Mass.), D. Glenn Boyer (Dept. of Energy, Washington, D.C.), Henry Herrman, and John Kelly (New Hampshire University, Durham) Jul. 1980 26 p refs Sponsored by DOE

(SAND-79-2245) Avail: NTIS HC A03/MF A01

Strategy and management techniques used in the development of the U.S. Subseabed Disposal Program for possible disposal of both high level waste and spent fuel are discussed. The first section summarizes the high level waste and spent fuel disposal program. The second section, the Subseabed Program Plan, addresses the technical and administrative tools which are employed to facilitate the day to day operation of the SDP. The third section addresses the current studies and future plans for addressing the legal, political, and international uncertainties that must be resolved before the SDP reaches the final engineering phases. S.F.

N81-14928# Sandia Labs., Albuquerque, N. Mex.
THE CASE AGAINST ELECTRIC VEHICLES IS RUNNING OUT OF GAS
Richard R. Bassett Jul. 1980 17 p Presented at a Colloq. held at Sandia Lab., Albuquerque, 19 Sep. 1979 Sponsored by DOE
(SAND-79-1770; CONF-7909175-1) Avail: NTIS HC A02/MF A01

Internal combustion vehicles are hampered by scarce, expensive fuel supplies and ever more restrictive pollution controls. The alternative is the electric vehicle. If oil is used to generate electricity, the system efficiency of the electric vehicle is 20 percent as compared to 10 percent for the internal combustion car. It is a multifueled vehicle because electricity may be generated by using nuclear, coal, solar, wind, hydro, etc. An overview of the status of the electric and hybrid vehicles is presented. Public Law 94-413, 'The Electric and Hybrid Vehicle Program', is reviewed. The state of programs of electric vehicle technology (controls, drive systems, energy storage) is discussed. Available electric vehicles will be noted with their specifications. S.F.

N81-14929# Battelle Pacific Northwest Labs., Richland, Wash.
CONCEPTUAL FRAMEWORK FOR DESCRIBING SELECTED URBAN AND COMMUNITY IMPACTS OF FEDERAL ENERGY POLICIES
F. A. Morris, A. A. Marcus, and D. Keller Jun. 1980 122 p refs Prepared in cooperation with Battelle Human Affairs Research Center, Seattle
(Contract DE-AC06-76RL-01830)
(PNL-3492) Avail: NTIS HC A06/MF A01

Analysis of the impact of a particular policy requires the following: identifying the policy and its effects (as estimated by others), isolating any effects that themselves constitute an urban and community impact, identfying any effects that change the value of determinants, and describing the impact with reference to the new values of determinants. Three impacts addressed were neighborhood stability, housing availability, and quality and availability of public services. For each, a definition and measure for the impact were specified; its principal determinants were identified; how the casual model can be used to estimate impacts by applying it to three illustrative Federal policies (domestic oil price decontrol, building energy performance standards, and increased Federal aid for mass transit) is demonstrated. DOE

N81-14930# Exide Management and Technology Co., Yardley, Pa.
RESEARCH, DEVELOPMENT, AND DEMONSTRATION OF LEAD-ACID BATTERIES FOR ELECTRIC VEHICLE PROPULSION Annual Report
H. A. Fugitti, D. L. Beals, T. W. Blickwedel, C. H. Carr, C. J. Daly, I. S. Klein, D. E. Nairn, J. B. Ockerman, A. J. Ragolia, and L. M. Reddell Jun. 1980 217 p refs
(Contract W-31-100-eng-38)
(ANL/OEPM-79-8) Avail: NTIS HC A10/MF A01

The initial phase of work comprises three factorial experiments to evaluate a variety of component combinations. Goals to be met by these batteries include the following: capacity at 3 h discharge, 20 to 30 kWh; specific energy, 40 Wh/kg; specific power, 1000 W/kg for 15 s; cycle life, 800 cycles to 80% depth; price, $50/kWh. The status of the factorial experiments is reviewed. The second phase of work, design of an advanced battery, has the following goals: 30 to 40 kWh; 60 Wh/kg; 150 W/kg for 15 s; 1000 cycles to 80% depth; $40/kWh. It is not yet possible to say whether these goals can be met. Numerous approaches are under study to increase the utilization of battery chemicals. A battery design with no live electrical connection above the battery is being developed. DOE

N81-14931# Institute of Gas Technology, Chicago, Ill.
URBAN WASTE CONVERSION SYSTEMS Final Report, 1 Oct. 1978 - 31 Mar. 1979
D. S. Cowen, Edward J. Daniels, and Martin Novil Feb. 1980 72 p refs
(Contract EI-78-X-01-5580)
(DSE-5580-T1) Avail: NTIS HC A04/MF A01

The market potential of the various systems available, or under development, for converting urban wastes into synthetic gas or liquids was assessed and the primary data base for this assessment is a survey which IGT has sent out to experts in this field. The experts were asked to evaluate various conversion systems by assigning point totals to an evaluation matrix. They were also asked to summarize their work in urban waste conversion, critical paths which represent obstacles to be surmounted by R & D were identified. These included materials handling and separation techniques, and protection of equipment from abrasive, caustic, or corrosive chemicals in the wastes. Prohibitive capital and operating costs in some existing systems were cited, since investor confidence is eroded by evidence of such experiences. Downtime was excessive with many systems, stemming from feed problems brought on by the heterogeneous nature of the feedstock. Systems using homogeneous feeds show considerably fewer problems. DOE

N81-14932# Westinghouse Electric Corp., Pittsburgh, Pa.
RESEARCH, DEVELOPMENT, AND DEMONSTRATION OF NICKEL IRON BATTERIES FOR ELECTRIC VEHICLE PROPULSION Annual Report, 1979
Jun. 1980 119 p refs
(Contract W-31-109-eng-38)
(ANL/OEPM-79-14) Avail: NTIS HC A06/MF A01

Full sized (220 Ah) cells, multicell modules, and 22 kWh batteries are being evaluated. Best finished cells are delivering 57 to 63 Wh/kg at C/3, based on cell weights of the finished cells, and in the actual designed cell volume. A 6 cell module (6-1) which demonstrated 239 Ah, 1735 Wh, 53 WH/kg at the C/3 drain rate is under evaluation at the National Battery Test Laboratory. The 2x4 battery delivered 22.5 kWh, as required (199 Ah discharge at 113 V bar) at the C/3 drain rate and performed satisfactorily under dynamometer and constant current drain tests. Some cell problems, related to construction, necessitated changing 3 modules, but the battery is now ready for further testing. Reduction in nickel plate swelling (and concurrent stack electrolyte starvation) to improve cycling, is one area of major effort to reach the final battery objectives. Pasted nickel electrodes are showing promise in initial full size cell tests and will continue to be evaluated in finished cells, along with other technology advancements. 30 figures, 14 tables. DOE

N81-14933# Globe-Union, Inc., Milwaukee, Wis. Battery Div.
RESEARCH, DEVELOPMENT AND DEMONSTRATION OF LEAD-ACID BATTERIES FOR ELECTRIC VEHICLE PROPULSION Annual Report, 1 Oct. 1978 - 30 Sep. 1979
Jun. 1980 96 p
(Contract W-31-109-eng-38)
(ANL/OEPM-79-9) Avail: NTIS HC A05/MF A01

Lead-acid batteries are investigated by an approach that concentrates on simultaneous optimization of battery design, materials, and manufacturing processing. DOE

N81-14934# Texas Univ. at Austin. Center for Research in Water Resources.
NETWORK FLOW OPTIMIZATION FOR WATER RESOURCES PLANNING WITH UNCERTAINTIES IN SUPPLY AND DEMAND Technical Completion Report, 1 Oct. 1978 - 31 Mar. 1980
Paul A. Jensen, Hsing Wei Chu, and Douglas D. Cochard Jul. 1980 144 p refs
(Contracts DI-14-34-0001-9046; DI-14-34-0001-0146; OWRT Proj. A-046-Tex(1))
(PB80-221161; CRWR-172; W80-06436;

OWRT-A-046-TEX(1)) Avail: NTIS HC A07/MF A01 CSCL 13B

Water resource planning for multireservoir water distribution systems requires decision making in the presence of uncertain predictions of water supplies and demands. To aid the decision maker, mathematical optimization procedures were applied to deterministic models of multiperiod water resource systems. Attempts to remedy this situation by incorporating uncertainty explicitly into the models are presented in three different approaches. All three approaches utilize network models and efficient computational methods applicable to networks. GRA

88 SPACE SCIENCES (GENERAL)

No abstracts in this category.

89 ASTRONOMY

Includes radio and gamma-ray astronomy; celestial mechanics; and astrometry.

N81-14935# Helsinki Univ. of Technology, Otaniemi (Finland). Radio Lab.

IMPROVEMENT OF THE SENSITIVITY OF MILLIMETER WAVE RADIO TELESCOPES BY SYNCHRONOUS TRACKING

Martti Tiuri and Seppo Urpo 1978 19 p refs

(Rept-S-108; ISBN-951-751-356-9) Avail: NTIS HC A02/MF A01

At millimeter waves, a so called dual-beam technique was used in radio source flux measurements to eliminate the effect of atmospheric fluctuations. In practice, when a radome covered telescopes is used, it is found that the deviation of measured values is still several times larger than the theoretical value determined by the system noise temperature. The fluctuations in the background noise from the surroundings of the telescope (e.g., through the radome frame) are the main reason for the increased deviation. Measurements indicated that the variations in the background are quite stable. A so called synchronous tracking method was introduced for eliminating the effect of the background. Experimental results are given showing that using this observing method a deviation close to the theoretical value can be obtained. T.M.

N81-14936# European Southern Observatory, Munich (West Germany).

[ACTIVITIES DURING 1979: ASTRONOMICAL RESEARCH] Annual Report

L. Woltjer 1980 60 p refs Original contains color illustrations

(ISSN-0531-4496) Avail: NTIS HC A04/MF A01

Several instruments were completed during the year and sent to LaSilla for installation. These include the 1.5 m Coude auxiliary telescope (CAT), the reticon camera for near infrared spectroscopy, the infrared photometers for the 3.6 m telescope and the triplet adapter with provisions for wide field photography and for small field electronographic imaging. The Coude echelle scanner was nearly completed, and work on the Cassegrain echelle spectrograph progressed. A CCD camera system was ordered and design work continued on the focal reducer and the cooled grating infrared spectrograph. While some studies were made of the VLT (very large telescope), much effort was devoted to bring the optics of the present LaSilla telescopes into an optimal condition. The HP computer based system in Geneva was further expanded. Preparations were made for the move of all ESO facilities in Europe to the new Headquarters building in Garching. A.R.H.

N81-14937# European Space Agency, Paris (France).

THE FAINT OBJECT CAMERA FOR THE SPACE TELESCOPE

F. Machetto, H. C. vandeHulst (Sterrewacht, Leiden), S. diSeregoAlighieri, and M. A. C. Perryman Oct. 1980 48 p refs

(ESA-SP-1028; ISSN-0379-6566) Avail: NTIS HC A03/MF A01; ESA, Paris FF 55 Member States, AU, CN, and NO. (+20% others)

The main characteristics of the optical system are described with special emphasis on cassegrain optics. A survey of possible applications for the camera is presented and it includes the study of stellar evolution, the study of stellar systems (globular clusters and normal galaxies), and studies in high energy astrophysics. Detailed observing programs are also described. T.M.

N81-14938*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

FRAGMENTATION IN ROTATING ISOTHERMAL PROTOSTELLAR CLOUDS

P. Bodenheimer (California Univ., Santa Cruz), J. E. Tohline (LASL), and D. C. Black 1980 7 p refs Presented at the 58th Intern. Astron. Union Colloq. on Stellar Hydrodyn., Los Alamos, N. Mex., Aug. 1980

(Contract W-7405-eng-26)

(NASA-TM-82229; LA-UR-80-2787; CONF-800872-5) Avail: NTIS HC A02/MF A01 CSCL 03A

Results of an extensive set of 3 D hydrodynamic calculations are presented. The calculations were performed to investigate the susceptibility of rotating clouds to gravitational fragmentation. DOE

90 ASTROPHYSICS

Includes cosmology; and interstellar and interplanetary gases and dust.

N81-14939# Aerospace Corp., El Segundo, Calif. Space Sciences Lab.

NUCLEOSYNTHESIS OF NEUTRON-RICH HEAVY NUCLEI DURING EXPLOSIVE HELIUM BURNING IN MASSIVE STARS

J. B. Blake, S. E. Woosley (Lick Observatory, Santa Cruz, Calif.), T. A. Weaver (California Univ., Livermore. Lawrence Livermore Lab.), and D. N. Schramm (Chicago Univ.) 1 Jan. 1981 24 p refs

(ATR-81(8454)-2) Avail: NTIS HC A02/MF A01

The production of heavy nuclei during explosive helium burning was calculated using a hydrodynamical model of a 15 M sub o (Type II) supernovae and a 'n-process' nuclear reaction network. The resulting neutron-rich heavy nuclei were not produced in the relative abundances of solar-system r-process material, especially in the vicinity of Pt, nor are any actinides produced. These deficiencies reflect an inadequate supply of neutrons. However some neutron-rich isotopes, normally associated with the r-process, were produced which may be significant for the production of isotopic anomalies in meteorites. Author

N81-14940# Los Alamos Scientific Lab., N. Mex.

EFFECT OF STELLAR STRUCTURE ON SUPERNOVA REMNANT EVOLUTION

Eric M. Jones, Barham W. Smith, and William C. Straka (Jackson State Univ., Miss.) 1980 7 p refs Presented at Intern. Astron. Union Colloq. 58 on Stellar Hydrodynamics, Los Alamos, N. Mex., 12-15 Aug. 1980

(Contract W-7405-eng-36; Grant NSF RIM-78-16987)

(LA-UR-80-2756) Avail: NTIS HC A02/MF A01

One dimensional hydrodynamic calculations were done of 1E51 erg explosions in 15M/sub sun/ stars. A steep external density gradient to the presupernova model was appended with the results: (1) the outer shock wave decelerates throughout the preSedov phase; (2) the expanding stellar envelope and the shocked interstellar material are Rayleigh-Taylor stable until the Sedov phase; and (3) steep internal density gradients are R-T unstable during the early expansion and may be the source of high velocity knots. DOE

91 LUNAR AND PLANETARY EXPLORATION

Includes planetology; and manned and unmanned flights.

For spacecraft design see 18 Spacecraft Design Testing, and Performance. For space stations see *15 Launch Vehicles and Space Vehicles.*

N81-14367*# *California Inst. of Tech., Pasadena.* Seismological Lab.

PLATE TECTONICS ON VENUS Final Technical Report

Don L. Anderson *In* Its Theoret. Invest. of Lunar and Planetary Interiors 30 Jun. 1980 10 p refs (For primary document see N81-14365 05-42)

(Grant NGL-05-002-069)

Avail: NTIS HC A03/MF A01 CSCL 03B

92 SOLAR PHYSICS

Includes solar activity, solar flares, solar radiation and sunspots.

N81-14941# Royal Greenwich Observatory, Herstmonceux (England).

PHOTOHELIOGRAPHIC RESULTS, 1972-1976

B. D. Yallop, C. M. Quarrington, and P. J. Rudd 1980 124 p (ROG-13; ISSN-0080-4371) Avail: NTIS HC A06/MF A01; Royal Greenwich Observatory, Herstomonceux, England £8

The last photoheliographic results to be published by the Royal Greenwich Observatory are presented. Tables show: (1) positions and areas of sunspots for each day of the year; (2) a general catalog of groups of sunspots; and (3) the total area of sunspots and faculae. Summarized results show the mean areas of sunspots and faculae, and the mean heliographic latitude of sunspots. A solar butterfly diagram is included showing the latitude plotted against synodic variations rotation number (and date) from the whole period of the Greenwich observations (from 1874 to 1976). A.R.H.

N81-14942# Royal Inst. of Tech., Stockholm (Sweden).

ENHANCED INTERACTION OF THE SOLAR WIND AND THE INTERSTELLAR NEUTRAL GAS BY VIRTUE OF A CRITICAL VELOCITY EFFECT

E. F. Petelski (Bonn Univ.), N. Brenning, H. W. Ripken (Bonn Univ.), H. J. Fahr (Bonn Univ.), and I. Axnaes Sep. 1979 44 p refs Submitted for publication

(TRITA-EPP-79 19) Avail: NTIS HC A03/MF A01

Counterstreaming of a neutral gas and a magnetized plasma gives rise to strongly enhanced ionization of the neutral gas and consequent braking of the relative motion if a critical velocity is exceeded. By comparing characteristic parameters of laboratory experiments and of the solar wind, it is shown that this mechanism must also be operating in the interaction region of the solar wind and the interstellar medium. Implications for the heliospheric parameters are assessed by simultaneously solving the coupled continuity equations for the mass, the momentum and the energy of the solar wind protons, for the mass of the interstellar hydrogen, and for the number of hot electrons created by critical velocity effects. It is shown that the electrons of the outer solar wind can be effectively prevented from adiabatically cooling to nonionizing energies. A considerably stronger deceleration of the solar wind, a weaker radial decrease of its density, and a steeper radial increase of the outer solar wind proton temperature and the interstellar gas density are obtained than are calculated from photoionization and charge exchange alone. A.R.H.

N81-14943*# Stanford Univ., Calif. Inst. for Plasma Research.

ADIABATIC AND NON-ADIABATIC PROCESSES IN THERMAL MODELS OF SOLAR HARD X-RAY BURSTS

A. Gordon Emslie Sep. 1980 23 p refs

(Contracts NGL-05-020-272; N00014-75-C-0673)

(NASA-CR-163839; AD-A091817; SU-IPR-819) Avail: NTIS HC A02/MF A01 CSCL 03/2

The processes by which the observed characteristics of the hard X-ray bremsstrahlung, *emitted from a solar flare loop, are* modulated, are investigated. This leads us to a set of inversion formulae, giving the behavior of physical variables in terms of *observable quantities. The method is applied to recent observa-* tional data. GRA

93 SPACE RADIATION

Includes cosmic radiation and inner and outer earth's radiation belts.

For biological effects of radiation see 52 Aerospace Medicine. For theory see *73 Nuclear and High-Energy Physics.*

No abstracts in this category.

99 GENERAL

N81-14944*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.

SPACE PLASMA PHYSICS ACTIVE EXPERIMENTS

W. T. Roberts, ed. Oct. 1980 239 p refs Presented at first Meeting of the Spacelab Space Plasma Phys. Expt. Working Group, Marshall Flight Center, Ala., 23-24 Sep. 1980

(NASA-CP-2165) Avail: NTIS HC A11/MF A01 CSCL 20I

The design concepts, capabilities, and operations of instruments developed for Spacelab 1 are discussed as well as the highly interrelated experiments planned for that mission. For individual titles, see N81-14945 through N81-14958.

N81-14945*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.

SPACELAB EXPERIMENT: ALAE, ATMOSPHERIC LYMAN-ALPHA EMISSIONS **c46**

In its Space Plasma Phys. Active Expt. Oct. 1980 p 1-8 refs (For primary document see N81-14944 05-99)

Avail: NTIS HC A11/MF A01 CSCL 04A

A spectrophotometer associated with two absorption cells, one filled with hydrogen and the other with deuterium, is described for use in studying various sources of Lyman-alpha emission in the atmosphere, in the interplanetary medium, and possibly in the galactic medium. As the result of charge exchange, Lyman-alpha emission is possibly present in auroral zones, equatorial zones, and at the foot of the polar cusp, where the solar wind interacts directly with the neutral atmosphere. Some emission is also expected from the plasma guns on board Spacelab. The use of the absorption cell is also a test for determining if the presence of geocoronal and interplanetary emission will prevent future astronomical observations of Lyman-alpha emissions. A.R.H.

N81-14946*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.

ATMOSPHERIC EMISSION PHOTOMETRIC IMAGING ON SPACELAB (AEPI) **c46**

S. B. Mende (Lockheed Palo Alto Research Lab., Calif.), W. G. Sandie (Lockheed Palo Alto Research Lab., Calif.), R. H. Eather (Boston College, Mass.), G. R. Swenson, K. S. Clifton, and P. M. Banks (Utah State Univ., Logan) *In its* Space Plasma Phys. Active Expt. Oct. 1980 p 9-26 refs (For primary document see N81-14944 05-99)

Avail: NTIS HC A11/MF A01 CSCL 04A

Two parallel detector systems are used for atmospheric emission photometric emission. The top system is a TV system using the image intensified S.E.C. tube as the detector. The bottom system, the photon counting array (P.C.A.), uses a microchannel plate intensified anode array tube and is equivalent to a 100 channel photomultiplier. For the television, the

filters are selected by means of a filter wheel set. The field of view of the is interchangeable between 20 and 6 degrees, by means of a moveable prism. The quartz window mu channel plate intensifier is fiber optically coupled to a 40-25 demagnifying tube which is in turn coupled to the S.E.C. tube. The PCA channel has a fixed field of view of 4 deg and a remote control interchangeable photometric converter optics which converts the imaging array into a multichannel photometer. The mu channel plate array tube amplifies the photons into detectable counts for the PCA electronics. The entire system is pointed by a two axis gimbal. The flight equipment to be acquired consists of a gyro package and an interactive flight control unit panel. The gyro package is necessary because of the inadequate attitude reference supplied by the current Spacelab systems. A.R.H.

N81-14947*# Utah State Univ., Logan. Center for Atmospheric and Space Sciences.

TRACE CONSTITUENTS IN THE MIDDLE ATMOSPHERE BY HIGH RESOLUTION UV SPECTROSCOPY c46

Douglas G. Torr, M. R. Torr, T. M. Donahue (Michigan Univ.), G. R. Carignan (Michigan Univ.), A. F. Nagy (Michigan Univ.), P. B. Hays (Michigan Univ.), E. R. Young (Michigan Univ.), S. K. Atreya (Michigan Univ.), J. P. Noxon (NOAA), and J. C. G. Walker (Arecibo Observatory, Puerto Rico) *In* NASA. Marshall Space Flight Center Space Plasma Phys. Active Expt. Oct. 1980 p 26-56 refs (For primary document see N81-14944 05-99)

HC A11/MF A01 CSCL 04A

An array of 5 autonomous spectrometers, the imaging spectrometric observatory covers a broad wavelength range (approximately 200 to 12,000 A), has a resolution selectable down to approximately 0.5 A, and a dynamic range of approximately 10 to the 7th power and is designed to select experiment measurement sequences by software control. Because current models of thermospheric ionic processes produce too much N2(+) ionization, the N2(+) reaction with O and the chemistry of metastable (N(+) ions and of O2(+) ions are objects of study on Spacelab 1. A.R.H.

N81-14948*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.

MEASUREMENT OF VISIBLE AND UV EMISSION FROM ENERGETIC NEUTRAL ATOM PRECIPITATION (ENAP), ON SPACELAB c46

Brian A. Tinsley *In its* Space Plasma Phys. Active Expt. Oct. 1980 p 57-74 refs (For primary document see N81-14944 05-99)

HC A11/MF A01 CSCL 04A

The charge exchange of plasmaspheric ions and exospheric H and O and of solar wind ions with exospheric and interplanetary H are sources of precipitating neutrals whose faint emission may be observed by the imaging spectrometric observatory during dark periods of the SL-1 orbit. Measurements of the interactions of these precipitating atoms with the thermosphere are needed to evaluate the heating and ionization effects on the atmosphere as well as the selective loss of i energetic ions from the sources (predominantly the ring current). A.R.H.

N81-14949*# York Univ., Toronto (Ontario).

WIDE ANGLE MICHELSON DOPPLER IMAGING INTERFEROMETER c35

G. G. Shepherd *In* NASA. Marshall Flight Center Space Plasma Phys. Active Expt. Oct. 1980 p 75-90 refs (For primary document see N81-14944 05-99)

Avail: NTIS HC A11/MF A01 CSCL 14B

The optical system, stepping control, phase and modulation depth, array detector, and directions sensor are described for a specialized type of Michelson interferometer which works at sufficiently high resolution to measure the line widths and Doppler shifts of naturally occurring atmospheric emissions. With its imaging capability, the instrument can potentially supply this data independently for each element of the 100 x 100 detector array. The experiment seeks: (1) to obtain vertical profiles of atmospheric winds and temperatures as functions of latitude by observing near the limb; (2) to acquire exploratory wind and temperature data on smaller scale structures in airglow irregularities and in auroral forms; and (3) to collaborate with other Spacelab experiments, such as barium cloud releases, in providing wind and temperature data. A.R.H.

N81-14950*# Herzberg Inst. of Astronomy, Ottawa (Ontario).

***SPACELAB ENERGETIC ION MASS SPECTROMETER* c35**

B. A. Whalen, I. B. McDiarmid, J. R. Burrows, R. D. Sharp (Lockheed Palo Alto Research Lab., Calif.), R. G. Johnson (Lockheed Palo Alto Research Lab., Calif.), and E. G. Shelley (Lockheed Palo Alto Research Lab., Calif.) *In* NASA. Marshall Space Flight Center Space Plasma Phys. Active Expt. Oct. 1980 p 91-106 refs (For primary document see N81-14944 05-99)

Avail: NTIS HC A11/MF A01 CSCL 14B

Basic design criteria are given for an ion mass spectrometer for use in studying magnetospheric ion populations. The proposed instrument is composed of an electrostatic analyzer followed by a magnetic spectrometer and simultaneously measures the energy per unit and mass per unit charge of the ion species. An electromagnet is used for momentum analysis to extend the operational energy range over a much wider domain than is possible with the permanent magnets used in previous flights. The energetic ion source regions, ion energization mechanisms, field line tracing, coordinated investigations, and orbit considerations are discussed and operations of the momentum analyzer and of the electrostatic energy analyzer are examined. A.R.H.

N81-14951*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.

SPACE EXPERIMENTS WITH PARTICLE ACCELERATORS (SEPAC), STATUS REVIEW, 23 SEPTEMBER 1980 c73

In its Space Plasma Phys. Active Expt. Oct. 1980 p 107-176 refs (For primary document see N81-14944 05-99)

Avail: NTIS HC A11/MF A01 CSCL 20H

The development responsibilities of SEPAC include: accelerator systems, diagnostic systems, power systems, dedicated experiment processor, interface unit, control panel, and all flight software. The operations of SEPAC, including automated experiments under DEP command control and SEPAC manual operations, are outlined. A diagram of the system configuration is presented. E.D.K.

N81-14952*# Rice Univ., Houston, Tex.

TEBPP: THEORETICAL AND EXPERIMENTAL STUDY OF BEAM-PLASMA-PHYSICS c75

Hugh R. Anderson, William Bernstein, Lewis M. Linson, K. Papadopoulos, Paul J. Kellogg, Edward P. Szuszczewicz, Thomas J. Hallinan, and Harold Leinbach *In* NASA. Marshall Space Flight Center Space Plasma Phys. Active Expt. Oct. 1980 p 117-138 refs (For primary document see N81-14944 05-99)

Avail: NTIS HC A11/MF A01 CSCL 20I

The interaction of an electron beam (0 to 10 keV, 0 to 1.5 Amp) with the plasma and neutral atmospheres at 200 to 400 km altitude is studied with emphasis on applications to near Earth and cosmical plasmas. The interaction occurs in four space time regions: (1) near electron gun, beam coming into equilibrium with medium; (2) equilibrium propagation in ionosphere; (3) ahead of beam pulse, temporal and spatial precursors; (4) behind a beam pulse. While region 2 is of the greatest interest, it is essential to study Region 1 because it determines the characteristics of the beam as it enters 2 through 4. E.D.K.

N81-14953*# TRW Defense and Space Systems Group, Redondo Beach, Calif. Systems Group Research Staff.

WAVES IN SPACE PLASMAS (WISP) c75

R. W. Fredericks *In* NASA. Marshall Space Flight Center Space Plasma Phys. Active Expt. Oct. 1980 p 139-170 refs (For primary document see N81-14944 05-99)

(WISP-336; WISP-80) Avail: NTIS HC A11/MF A01 CSCL 20I

Topics included in the WISP science objectives are: (1) VLF wave injection experiments; (2) traveling ionospheric disturbances and atmospheric gravity waves; (3) ionospheric bubbles; and (4) plasma wave physics. Flow charts of the WISP investigation organization, the project life cycle and the instrumentation are given. E.D.K.

N81-14954*# Communications Research Centre, Ottawa (Ontario).

THE WISP/HF SYSTEM FOR SPACELAB c35

H. G. James *In* NASA. Marshall Flight Center Space Plasma Phys. Active Expt. Oct. 1980 p 173-184 refs (For primary

document see N81-14944 05-99)
Avail: NTIS HC A11/MF A01 CSCL 14B

The high frequency part of the waves in space plasmas system, WISP/HF, is a flexible shuttle Spacelab instrument for transmitting, receiving, and processing signals in the 0.3 to 30 MHz range. It permits a wide range of plasma wave experiments in the ionosphere including studies of the transmitting antenna, fundamentals of electromagnetic (EM) and electrostatic (ES) waves in magnetoplasmas, instabilities and nonlinearities, and remote sounding of ionospheric structure. Collaborative investigations involving other WISP equipment (e.g., antenna and propagation studies with the WISP/VLF system) or other Spacelab facilities (e.g., beam plasma interactions using charged particle guns) are envisaged. A few specific examples illustrate the relevance of WISP/HF to current scientific interest. The overall goal is to help build a comprehensive understanding of plasmaspheric wave physics through group studies. Author

N81-14955*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
MAGNETOSPHERIC MULTIPROBES: INVESTIGATIONS AND INSTRUMENTATION **c35**
J. L. Burch (Southwestern Research Inst.), C. R. Chappell, S. A. Fields, C.-G. Falthammar (Swedish Royal Inst. of Technology), J. D. Winningham (Southwestern Research Inst.), W. B. Hanson (Texas Univ., Dallas), R. A. Heelis (Texas Univ., Dallas), W. J. Heikkila (Texas Univ., Dallas), M. Sugira (NASA. Goddard Space Flight Center), and W. H. Farthing (NASA. Goddard Space Flight Center) *In* NASA. Marshall Space Flight Center Space Plasma Phys. Active Expt. Oct. 1980 p 185-214 refs (For primary document see N81-14944 05-99)
Avail: NTIS HC A11/MF A01 CSCL 14B

The multiprobe scientific objectives are to: (1) determine the spatial structure of plasma phenomena such as the aurora, convection reversals, and ion troughs; (2) separate spatial and temporal variations in these phenomena; (3) determine field aligned current densities; (4) perform multiple point analysis of particle beams, wave fields, and plasma clouds that are injected into the ionosphere and magnetosphere by Spacelab active experiment facilities. Trade studies described include: instrument accommodations, power, attitude determination, electric field antennas, storage and ejection, thermal control, tracking communications, command and data management, payload and mission specialist support, functional objectives, and orbital analysis. E.D.K.

N81-14956*# Iowa Univ., Iowa City. Dept. of Physics and Astronomy.
A RECOVERABLE PLASMA DIAGNOSTICS PACKAGE (RPDP) FOR SPACELAB **c75**
Stanley D. Shawhan, K. L. Ackerson, R. R. Anderson, J. D. Craven, N. Dangelo, L. A. Frank, D. A. Gurnett, R. R. Shaw, L. P. Block (Royal Inst. of Technology, Stockholm), and C.-G. Falthammar (Royal Inst. of Technology, Stockholm) *In* NASA. Marshall Space Flight Center Space Plasma Phys. Active Expt. Oct. 1980 p 213-236 refs (For primary document see N81-14944 05-99)
Avail: NTIS HC A11/MF A01 CSCL 20I

The RPDP is a fully instrumented, ejectable and recoverable unit with flight and ground support systems so that it can be utilized attached to the orbiter remote manipulator system, tethered from the orbiter, or as an orbiter subsatellite. Core instruments on the RPDP are flight proven hardware which provide diagnostics measurements of energetic particles, AC electromagnetic and electrostatic waves, vector magnetic field signatures of current systems, vector electric field signatures associated with plasma flow and particle acceleration, thermal plasma ion composition and density, thermal plasma electron density and temperature, and images of optical emissions regions in UV or visible wavelengths. E.D.K.

N81-14957*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
CHEMICAL RELEASE MODULE FACILITY **c12**
David L. Reasoner *In its* Space Plasma Phys. Active Expt. Oct. 1980 p 237-246 refs (For primary document see N81-14944 05-99)
Avail: NTIS HC A11/MF A01 CSCL 22A

The chemical release module provides the capability to conduct: (1) thermite based metal vapor releases; (2) pressurized gas releases; (3) dispersed liquid releases; (4) shaped charge releases from ejected submodules; and (5) diagnostic measurements with pi supplied instruments. It also provides a basic R-F and electrical system for: (1) receiving and executing commands; (2) telemetering housekeeping data; (3) tracking; (4) monitoring housekeeping and control units; and (5) ultrasafe disarming and control monitoring. E.D.K.

N81-14958*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
TETHER FACILITY PRESENTATION **c12**
P. M. Banks *In its* Space Plasma Phys. Active Expt. Oct. 1980 p 247-258 refs (For primary document see N81-14944 05-99)
Avail: NTIS HC A11/MF A01 CSCL 22A

The history of the tethered satellite system is outlined. Future uses of the system in geophysics, plasmas, and other support activities are presented. E.D.K.

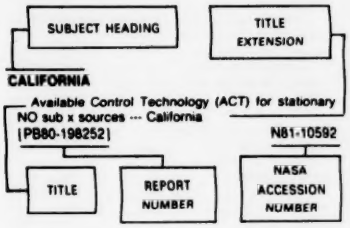
N81-14959# Consiglio Nazionale delle Ricerche, Rome (Italy). Committee for Space Research.
SPACE RESEARCH ACTIVITY IN ITALY. REPORT TO COSPAR
A. M. Scheggi 1980 26 p refs Presented at 23rd Plenary Meeting COSPAR, Budapest, 2-14 Jun. 1980
Avail: NTIS HC A03/MF A01

Activities in support of COS-B, IUE, EXOSAT, HEAO-2, and Spacelab projects are summarized. Instruments developed for X-ray and gamma ray astronomy are described as well as experiments to study the cosmic microwave background, the cosmic ray intensity at the ground, as cosmic fireballs. Other research efforts highlighted relate to submillimeter spectroscopy; plasma experiments for the ISEE-2 satellites; a magnetic field experiment for GEOS 1 and 2; studies of ionospheric absorption by radiowave propagation; transionospheric propagation; infrared astronomy; fluid physics; Pageos balloon orbits; space communications; image processing; and networks and communications systems. A.R.H.

N81-14960# Southampton Univ. (England). Inst. of Sound and Vibration Research.
[ACTIVITIES OF THE INSTITUTE OF SOUND AND VIBRATION RESEARCH FOR THE YEAR ENDING MARCH 1980] Annual Report, period ending Mar. 1980
1980 51 p refs
Avail: NTIS HC A04/MF A01

Research in fluid dynamics, automotive engineering, structural dynamics, and electronics is summarized and its role in acoustics is discussed. A review of industrial noise and vibration control is presented. Data analysis and a compendium of computer programs are presented. T.M.

Typical Subject Index Listing



The subject heading is the key to the subject content of the document. Titles, report numbers, and accession numbers of pertinent documents are provided under each subject heading. When the title is insufficiently descriptive of the document content, a title extension has been added, separated from the title by three hyphens. The report number helps to indicate the type of document cited (e.g., NASA report, NASA translation, NASA contractor report). The NASA accession number is the number by which the document abstracts are arranged in this journal and by which the document is sold or requested. The titles, with title extensions if present, are arranged under each subject heading in ascending accession number order. The subject headings have been selected from the latest revision of the *NASA Thesaurus* (NASA SP-7050).

A

ABLATION
New methods to detect particle velocity and mass flux in arc-heated ablation/erosion facilities
N81-14166

ABLATIVE MATERIALS
Thermal analysis of proposed W81 heatshield materials flown on a Malemute system
[SAND-79-2417] N81-14013

ABLATIVE NOSE CONES
A three-dimensional body-fitted coordinate system for flow field calculations on asymmetric nosetips
N81-14711

ABSORPTION SPECTRA
The relationship between differential areas and concentration in derivative absorption spectrophotometry
[DRIC-TRANS-6127] N81-14029
Study of combustion and flame processes initiated by IR laser-induced absorption
[COO-4695-4] N81-14049
Laser excitation of fluorescence in the A-X system of NH
[NASA-TM-82231] N81-14304

ABSORPTIVITY
The use of approximate expressions in power transmission spectrometry
[NPL-DES-64] N81-14024

ABUNDANCE
Nucleosynthesis of neutron-rich heavy nuclei during explosive helium burning in massive stars
[ATR-81(8454)-2] N81-14939

ACCELERATION (PHYSICS)
On one-dimensional acceleration waves in composite materials modeled as interpenetrating solid continua
[AD-A091615] N81-14011

ACCEPTABILITY
Multiparameter hypothesis testing and acceptance sampling
[AD-A091607] N81-14340

ACCURACY
Metric accuracy analysis
[AD-A091749] N81-13982

ACETIC ACID
Bioconversion of biomass gasifier product gases to organic chemicals
[PB80-216641] N81-14135

ACETYL COMPOUNDS
Electrochemistry of acetylides, nitrides and carbon cathodes in molten halides
[DOE/ER-04445/T1] N81-14041

ACID RAIN
The chemical composition of atmospheric precipitation in Minnesota and North Dakota
[DOE/EV-04327/1] N81-14510
NOx national emission inventory estimates
[PB80-224058] N81-14522
A survey of acid precipitation in northern California
[PB80-225311] N81-14523

ACOUSTIC ATTENUATION
Ultrasonic attenuation in normal and superconducting indium
[AD-A091605] N81-14797

ACOUSTIC EXCITATION
Static and dynamic response of an aluminum alloy panel having a central opening with combined in-plane biaxial static loading and acoustic excitation
[ISVR-TR-103] N81-14353

ACOUSTIC MEASUREMENTS
Acoustic fuel quantity measurement system. Signal conditioning unit
[AD-A091758] N81-13961
Seismological bulletin of the seismograph stations in the Netherlands, volume 63, 1975
[KNMI-108-63] N81-14538
Noise prediction for jetstar prop-fan test
[NASA-TM-81916] N81-14790

ACOUSTICS
The Dalembertometer
[ISL-CO-220/79] N81-14292
Activities of the Institute of Sound and Vibration Research for the year ending March 1980
N81-14960

ACOUSTO-OPTICS
Stark cell optoacoustic detection of constituent gases in sample
[NASA-CASE-NPO-14143-1] N81-14015

ACRYLIC ACID
Stage 1 propellant, surveillance report glacial acrylic acid, motors GAA-001 and GAA-002, TP-H1011
[AD-A091707] N81-14110

ACRYLIC RESINS
Thermally stimulated discharge currents from sodium nitrate doped polyacrylonitrile
[AD-A091638] N81-14248

ACRYLONITRILES
Thermally stimulated discharge currents from sodium nitrate doped polyacrylonitrile
[AD-A091638] N81-14248

ACTIVATION ENERGY
Development and demonstration of a Stirling/Rankine heat activated heat pump
[DOE/CS-20043/T1] N81-14283
Amorphous thin films for solar cell application --- magnetron sputtering, ion implantation, and activation energy
[DOE/ET-23040/2] N81-14419

ACTUATORS
Research and development of control actuation systems for aircraft. Volume 2. The evaluation of a force sharing and an active on-line fly-by-wire actuation system
[AD-A091559] N81-13976
On the improvement of miniature pyrotechnic devices for space application
[ESA-CR(P)-1296] N81-14105
An investigation of a digital electrohydraulic servovalve
[AD-A091563] N81-14326

ACUITY
A literature study on visual motion accuity (minimum perceptible movement)
[DFVLR-MITT-80-06] N81-14618

ADAPTIVE CONTROL
Further investigations of adaptive-wall wind tunnels
[AD-A091774] N81-13977
Adaptive Antenna Control (AAC) program
[AD-A091764] N81-14197
A class of sequential input adaptive systems
[AD-A091655] N81-14687

ADDITIVES
Comparison of the temperature-dependent elastic modulus of TiFe with H-doped TiFe in the (111) direction
[AD-A091507] N81-14065
Addition polyimide end cap study
[NASA-TM-81917] N81-14081
Thermally stimulated discharge currents from sodium nitrate doped polyacrylonitrile
[AD-A091638] N81-14248

ADHESIVE BONDING
Surface finishing
[NASA-CASE-MSC-12631-3] N81-14077

ADHESIVES
Addition polyimide end cap study
[NASA-TM-81917] N81-14081

ADIABATIC EQUATIONS
Adiabatic and non-adiabatic processes in thermal models of solar hard X-ray bursts
[NASA-CR-163839] N81-14943

ADRENAL GLAND
Naloxone inhibits and morphine potentiates. The adrenal steroidogenic response to ACTH
[NASA-TM-81253] N81-14606

ADRENOCORTICOTROPIN (ACTH)
Naloxone inhibits and morphine potentiates. The adrenal steroidogenic response to ACTH
[NASA-TM-81253] N81-14606

ADVECTION
Numerical solution of an advection-diffusion equation for a dissolved species in a pulsating crack
[NPL-DNACS-28/80] N81-14025

AERIAL PHOTOGRAPHY
Earth Resources: a continuing bibliography with indexes
[NASA-SP-7041(27)] N81-14371
Analysis and development of image statistics and redundancy removal
[AD-A091600] N81-14381

AEROACOUSTICS
Noise and noise abatement in fans and blowers: A review
[DFVLR-FB-80-16] N81-14796

AERODYNAMIC CHARACTERISTICS
Rotary balance data for a single-engine agricultural airplane configuration for an angle-of-attack range of 8 deg to 90 deg
[NASA-CR-3311] N81-13923
Effects of nonlinearities on wing store flutter
[MBB-FE-17/S/PUB/27] N81-13974

AERODYNAMIC COEFFICIENTS
Wind-tunnel test of an articulated helicopter rotor model with several tip shapes
[NASA-TM-80080] N81-13918
AERODYNAMIC CONFIGURATIONS
A system for aerodynamic design and analysis of supersonic aircraft. Part 2: User's manual
[NASA-CR-3352] N81-13920
Computational aerodynamic design tools and techniques used at fighter development
[MBB-FE-122/S/PUB/13] N81-13950
Laminar-airfoils for transport aircraft
[DFVLR-MITT-80-07] N81-13952
Skylab orbital lifetime prediction and decay analysis
[NASA-TM-78308] N81-13979
Low-speed wind-tunnel tests of two weathercocking sensors
[WSRL-0171-TM] N81-14575
An investigation into grid patching techniques N81-14708
Grid generation for general three-dimensional configurations N81-14714
AERODYNAMIC FORCES
Clear air turbulence: Historical comments N81-14562
AERODYNAMIC LOADS
Survey of Workshops on Meteorological and Environmental Inputs to Aviation Systems N81-14556
AERODYNAMIC NOISE
An investigation of turbulent wall-pressure fluctuations in a pipe downstream of an abrupt enlargement of its cross-sectional area
[DFVLR-FB-80-11] N81-14273
Exhaust noise in flight: The role of acoustic installation effects
[PNR-90029] N81-14793
A preliminary analysis of the audible noise of constant speed, horizontal axis wind turbine generators
[DOE/EV-0089] N81-14799
AERODYNAMIC STABILITY
A contribution to stabilization of flight vehicle parachute systems
[DFVLR-MITT-80-05] N81-13926
Active flutter suppression on an F-4F aircraft with external stores using already existing control surfaces
[MBB-FE-17/S/PUB/24] N81-13972
AERODYNAMICS
Aeronautical Engineering: A continuing bibliography with indexes, supplement 128, November 1980
[NASA-SP-7037(128)] N81-13914
Review of theoretical and experimental results on three dimensional turbulent wakes and boundary layers
[ONERA-NT-1980-4] N81-13930
Development of high-temperature turbine subsystem technology to a technology readiness status, phase 2
[FE-1806-72] N81-14332
AEROELASTICITY
Passive control of wing/store flutter
[NASA-TM-81865] N81-13922
The effects of warhead-induced damage on the aeroelastic characteristics of lifting surfaces. Volume 1: Aeroelastic effects
[AD-A091674] N81-13955
AERONAUTICAL ENGINEERING
Aeronautical Engineering: A continuing bibliography with indexes, supplement 128, November 1980
[NASA-SP-7037(128)] N81-13914
A system for aerodynamic design and analysis of supersonic aircraft. Part 2: User's manual
[NASA-CR-3352] N81-13920
Computational aerodynamic design tools and techniques used at fighter development
[MBB-FE-122/S/PUB/13] N81-13950
Fundamentals of conceptual design optimization of subsonic transport aircraft
[VTH-LR-292] N81-13951
AERONOMY
Negative ion chemistry in the terrestrial D-region and signal flow graph theory
[AERONOMICA-ACTA-A-217-1980] N81-14528
Meteorological measurement system for support of atmospheric propagation studies
[UCRL-84547] N81-14594
AEROSOLS
Lidar observations at 0.7-micrometers and 10.6 micrometers wavelengths during smoke week 2
[AD-A091561] N81-14382
The chemical composition of atmospheric precipitation in Minnesota and North Dakota
[DOE/EV-04327/1] N81-14510
Air chemistry measurements in the lower atmosphere over Sweden: Data evaluation
[AC-45] N81-14533
AEROSPACE ENGINEERING
Installing fiber insulation
[NASA-CASE-MSC-16973-1] N81-14317
AEROSPACE ENVIRONMENTS
On the improvement of miniature pyrotechnic devices for space application
[ESA-CR(P)-1296] N81-14105
AEROSPACE INDUSTRY
Solid lubricants: Molybdenum compounds. Citations from the Engineering Index data base
[PB80-815681] N81-14102
AEROSPACE MEDICINE
Aerospace Medicine and Biology: A continuing bibliography with indexes, supplement 212
[NASA-SP-7011(212)] N81-14611
AEROSPACE VEHICLES
Development of MIL-HDBK-5 design allowable properties for several aerospace materials --- mechanical properties of 2024 T42 extrusion and Ti6Al2Sn4Zr2Mo duplex annealed sheet
[AD-A091602] N81-14063
AFTERBODIES
An evaluation of wind tunnel test techniques for aircraft nozzle afterbody testing at transonic Mach numbers
[AD-A091775] N81-13931
Evaluation of wind tunnel nozzle afterbody test techniques utilizing a modern twin engine fighter geometry at Mach numbers from 0.6 to 1.2 --- YF-17 aircraft
[AD-A091545] N81-13932
AFTERGLOWS
The chemistry of energetic fragments
[AD-A091823] N81-14031
AGE FACTOR
Tables relating pure-tone audiometric threshold to age
[NPL-AC-94] N81-14616
AGGLOMERATION
Agglomeration in suspension: A study of mechanisms and kinetics
[WTHD-120] N81-14027
AGING (MATERIALS)
Cryogenic aging of metals. Citations from the NTIS data base
[PB80-808868] N81-14075
Propellant surveillance report, LGM-30 F and G stage 1 phase G, series 1 TP-H1011
[AD-A091765] N81-14109
AGRICULTURE
Demonstration of an advanced solar garden with a water ceiling
[DOE/R5-10122/2] N81-14459
Global energy futures and the carbon dioxide problem N81-14502
AIR CURRENTS
Automated emergency meteorological response system
[DP-MS-80-81] N81-14592
AIR DUCTS
Air/gas system dynamics of fossil fuel power plants. Volume 3: Experimental pressure test data of a 500 MW unit and of a 125 MW unit
[EPRI-CS-1444-VOL-3] N81-14478
AIR FLOW
Numerical computations of swirling recirculating flow
[NASA-CR-165196] N81-14267
AIR JETS
The Dalembertometer
[ISL-CO-220/79] N81-14292
AIR LAND INTERACTIONS
One-dimensional simulation of temperature and moisture in atmospheric and soil boundary layers
[NASA-CR-163841] N81-14531
AIR POLLUTION
Combined Electrolysis Catalytic Exchange (CECE)
[MLM-2774] N81-14051
Remote sensing applied to pollution monitoring. Citations from the International Aerospace Abstracts data base
[NASA-CR-163830] N81-14388
Assessment of the visibility impairment caused by the emissions from the proposed power plant at Boron, California
[NASA-CR-163103] N81-14504
Monitoring pollutant gases from space using passive microwave techniques --- lowest layer of the troposphere
[NPL-QU-59] N81-14505
Environmental impacts of the satellite power system (SPS) on the middle atmosphere
[NASA-TM-82228] N81-14508
Development of an airborne lidar for characterizing particle distribution in the atmosphere
[EPRI-EA-1538] N81-14514
Misspecification of trend in spatial random function interpolation with application to oxidant mapping
[DOE/EV-02874/59] N81-14517
Visibility in California
[PB80-216765] N81-14518
Trace metals and Stationary Conventional Combustion Processes. Volume 1: Technical report
[PB80-216161] N81-14519
NOx national emission inventory estimates
[PB80-224058] N81-14522
A survey of acid precipitation in northern California
[PB80-225311] N81-14523
Urban air pollution. Citations from the NTIS data base
[PB80-814411] N81-14526
Automated emergency meteorological response system
[DP-MS-80-81] N81-14592
AIR QUALITY
Overview of the environmental concerns of coal transportation
[ANL/EES/TM-99] N81-14515
AIR SAMPLING
Air chemistry measurements in the lower atmosphere over Sweden: Data evaluation
[AC-45] N81-14533
AIR TO AIR MISSILES
Heat-transfer tests on a full and 1/4 scale aim-9E sidewinder missile and a 1/15 scale GBU-8 guided bomb unit at Mach numbers 1.5, 2.0 and 2.5
[AD-A091805] N81-13987
AIR TO AIR REFUELING
An investigation of safety hazards and reliability problems in aerial refueling stores
[AD-A091788] N81-13938
AIR TRAFFIC
Communications support for flight data entry and printout terminals
[AD-A091580] N81-14202
AIR TRAFFIC CONTROL
Southern California aviation system study
[PB80-215544] N81-13916
Midair and near midair collisions on two- and three-dimensional curvilinear flight paths
[DFVLR-FB-80-13] N81-13944
Wind shear systems integration plan, VICON (visual confirmation) reliability analysis
[PB80-218233] N81-13949
Proceedings: Fourth Annual Workshop on Meteorological and Environmental Inputs to Aviation systems
[NASA-CP-2139] N81-14555
AIR TRANSPORTATION
Southern California aviation system study
[PB80-215544] N81-13916
AIR WATER INTERACTIONS
Experimental sea slicks in the Marsen (Maritme Remote Sensing) exercise
[AD-A091850] N81-14376
AIRBORNE EQUIPMENT
Observing lightning from ground-based and airborne stations N81-14566
AIRCRAFT ACCIDENT INVESTIGATION
Testimony of Elwood T. Driver, Vice Chairman, National Transportation Safety Board, accompanied by Gerrit J. Walhout, Chief, Human Factors Division, and Matthew M. McCormick, Senior Air Safety Investigator, Human Factors Division N81-13934
AIRCRAFT ACCIDENTS
Turbulence: From a pilot's viewpoint N81-14561
The microburst: Common factor in recent aircraft accidents N81-14571

Human factors problems in general aviation
[AD-A091670] N81-14625

AIRCRAFT ANTENNAS
Volumetric pattern prediction of antennas on aircraft using the geometrical theory of diffraction
[DFVLR-FB-80-01] N81-14195

AIRCRAFT COMPARTMENTS
Aviation safety: Interior compartment materials
[GPO-50-388] N81-13933

AIRCRAFT CONFIGURATIONS
Component-adaptive grid embedding N81-14697

AIRCRAFT CONSTRUCTION MATERIALS
Testimony of James J. Kramer, Associate Administrator for Aeronautics and Space Technology, National Aeronautics and Space Administration, accompanied by John H. Enders, Project Manager, Aviation Safety Technology Office, John A. Parker, Chemical Research Projects Office, NASA-Ames Research Center, and Demitrius A. Kourtides, Chemical Research Projects Office, NASA-AMES Research Center N81-13935
Testimony of Richard W. Taylor, Vice President and Special Assistant to the President, and Eugene A. Bara, Chief Engineer, Payloads Systems, Boeing Commercial Airplane Company N81-13936
Testimony of a panel consisting of: Lloyd E. Frisbee, Vice President, Engineering and Operations, Lockheed California Company; Lyle A. Wright, Director, Powerplant Engineering, Douglas Aircraft Company, accompanied by Doctor H. C. Schjelderup, Chief Technology Engineer, Materials and Process Engineering, and F. E. Duskin, Senior Design Engineer, Interiors Engineering, Douglas Aircraft Company N81-13937

AIRCRAFT CONTROL
Landing flying qualities evaluation criteria for augmented aircraft
[NASA-CR-163097] N81-13969
Theoretical investigation of the influence of spoiler dynamics on the handling qualities of an aircraft with direct lift control
[DFVLR-FB-80-07] N81-13975

AIRCRAFT DESIGN
A system for aerodynamic design and analysis of supersonic aircraft. Part 2: User's manual
[NASA-CR-3352] N81-13920
Computational aerodynamic design tools and techniques used at fighter development
[MBB-FE-122/S/PUB/13] N81-13950
Fundamentals of conceptual design optimization of subsonic transport aircraft
[VTH-LR-292] N81-13951
Laminar-airfoils for transport aircraft
[DFVLR-MITT-80-07] N81-13952
Technological forecasting--aircraft design. Citations from the International Aerospace data base
[PB80-815970] N81-13957
Economic evaluation of flying-qualities design criteria for a transport configured with relaxed static stability
[NASA-TP-1760] N81-13968

AIRCRAFT ENGINES
An evaluation of wind tunnel test techniques for aircraft nozzle afterbody testing at transonic Mach numbers
[AD-A091775] N81-13931
Advanced Technology Spark-Ignition Aircraft Piston Engine Design Study
[NASA-CR-165162] N81-13963
Prevention of spline wear by soft metallic coatings --- aircraft engines
[AD-A091861] N81-14064
Compressor configuration and design optimization for the high reliability gas turbine
[DOE/ET-15425/T1] N81-14327
The measurement of aero gas turbine noise
[PNR-90032] N81-14795

AIRCRAFT EQUIPMENT
Evaluation of a computer-generated perspective tunnel display for flight path following
[NASA-TP-1736] N81-13958

AIRCRAFT FUELS
Testimony of Elwood T. Driver, Vice Chairman, National Transportation Safety Board, accompanied by Gerrit J. Walhout, Chief, Human Factors Division, and Matthew M. McCormick, Senior Air Safety Investigator, Human Factors Division N81-13934

AIRCRAFT HAZARDS
An investigation of safety hazards and reliability problems in aerial refueling stores
[AD-A091788] N81-13938
Aeronautical concerns and National Aeronautics and Space Administration atmospheric electricity projects N81-14567
The microburst: Common factor in recent aircraft accidents N81-14571
Doctor Fujita's microburst analysis at Chicago N81-14572

AIRCRAFT INDUSTRY
An assessment of General Aviation utilization of advanced avionics technology
[NASA-CR-159328] N81-13941
Current aircraft survey (approach speeds, gross weights, and Dimensions)
[PB80-225691] N81-13956

AIRCRAFT MAINTENANCE
Aircraft maintenance. Citations from the International Aerospace Abstracts data base
[PB80-815905] N81-13917

AIRCRAFT MANEUVERS
Maneuvering aircraft: Noise pollution and control. Citations from the NTIS data base
[PB80-815566] N81-14525

AIRCRAFT NOISE
Maneuvering aircraft: Noise pollution and control. Citations from the NTIS data base
[PB80-815566] N81-14525
Assessment of ground effects on the propagation of aircraft noise: The T-38A flight experiment
[NASA-TP-1747] N81-14788
The rating of helicopter noise: Development of a proposed impulse correction
[NPL-AC-93] N81-14792

AIRCRAFT PILOTS
Turbulence: From a pilot's viewpoint N81-14561

AIRCRAFT SAFETY
Aviation safety: Interior compartment materials
[GPO-50-388] N81-13933
Testimony of James J. Kramer, Associate Administrator for Aeronautics and Space Technology, National Aeronautics and Space Administration, accompanied by John H. Enders, Project Manager, Aviation Safety Technology Office, John A. Parker, Chemical Research Projects Office, NASA-Ames Research Center, and Demitrius A. Kourtides, Chemical Research Projects Office, NASA-AMES Research Center N81-13935
Testimony of Richard W. Taylor, Vice President and Special Assistant to the President, and Eugene A. Bara, Chief Engineer, Payloads Systems, Boeing Commercial Airplane Company N81-13936
Testimony of a panel consisting of: Lloyd E. Frisbee, Vice President, Engineering and Operations, Lockheed California Company; Lyle A. Wright, Director, Powerplant Engineering, Douglas Aircraft Company, accompanied by Doctor H. C. Schjelderup, Chief Technology Engineer, Materials and Process Engineering, and F. E. Duskin, Senior Design Engineer, Interiors Engineering, Douglas Aircraft Company N81-13937
Proceedings: Fourth Annual Workshop on Meteorological and Environmental Inputs to Aviation systems
[NASA-CP-2139] N81-14555
Aviation meteorology research and development: A status report N81-14557
Measuring weather for aviation safety in the 1980's N81-14568
Human factors problems in general aviation
[AD-A091670] N81-14625

AIRCRAFT SPECIFICATIONS
Current aircraft survey (approach speeds, gross weights, and Dimensions)
[PB80-225691] N81-13956

AIRCRAFT STRUCTURES
The effects of warhead-induced damage on the aeroelastic characteristics of lifting surfaces. Volume 1: Aeroelastic effects
[AD-A091674] N81-13955
Controls of aeronautical structures under fatigue testing by holographic pulsed lasers interferometry
[ISL-CO-218/79] N81-14300

AIRCRAFT SURVIVABILITY
Aviation safety: Interior compartment materials
[GPO-50-388] N81-13933

AIRFOIL PROFILES
Wind-tunnel test of an articulated helicopter rotor model with several tip shapes
[NASA-TM-80080] N81-13918

AIRFOILS
A computer program for the design and analysis of low-speed airfoils, supplement
[NASA-TM-81862] N81-13921
Surface finishing
[NASA-CASE-MSC-12631-3] N81-14077

AIRGLOW
Ionospheric effects of rocket exhaust products (HEAO-C, Skylab and SPS-HLLV)
[DOE/ER-0082] N81-14544
Spacelab experiment: ALAE, Atmospheric Lyman-Alpha Emissions N81-14945
Atmospheric Emission Photometric Imaging on Spacelab (AEPI) N81-14946
Wide angle Michelson Doppler imaging interferometer --- measuring atmospheric emissions N81-14949

AIRLINE OPERATIONS
Aircraft maintenance. Citations from the International Aerospace Abstracts data base
[PB80-815905] N81-13917

AIRPORT PLANNING
Southern California aviation system study
[PB80-215544] N81-13916

AIRPORTS
Statistical relationship between median visibility and conditions of worstcase manmade impact on visibility
[LA-UR-80-2485] N81-14550

ALBEDO
Estimates of incoming shortwave radiation and net radiation from standard meteorological data
[KNMI-WR-80-6] N81-14189

ALBUMINS
Electron spin resonance of homozygous beta thalassemic plasma
[ISS-P-79/13] N81-14850

ALGAE
Bioengineering aspects of inorganic carbon supply to mass algal cultures
[DOE/ET-20604/1] N81-14608
Pressure harvesting of microalgae
[PB80-221781] N81-14609
Phytoplankton composition and abundance in Southern Lake Huron
[PB80-216013] N81-14610

ALGEBRA
A characterization of computable data types by means of a finite, equational specification method
[MC-IW-124/79] N81-14649
Equational specifications for computable data types: Six hidden functions suffice and other sufficiency bounds
[MC-IW-128/80] N81-14652
Computing in algebraic systems
[MC-IW-130/80] N81-14653
Three dimensional spline-generated coordinate transformations for grids around wing-body configurations N81-14707
Research in algebraic manipulation
[AD-A091675] N81-14755

ALGOL
The revised ALGOL 68 test set
[MC-IW-122/79] N81-14629

ALGORITHMS
Digital data reduction algorithm for oscillatory signals with an application to L-instability
[VTH-LR-298] N81-14194
Performance of the Gradient Adaptive Equalizer with Inherent Optimal Adjusting Step in Presence of Noise and Arithmetic Errors
[FUB-35-1979] N81-14240
Analysis and development of image statistics and redundancy removal
[AD-A091600] N81-14381
Bitonic sort on ultracomputers
[MC-IW-117/79] N81-14626
Abstracto 84: The next generation
[MC-IW-120/79] N81-14628
Computing in algebraic systems
[MC-IW-130/80] N81-14653
Studies of some algorithms for digital picture processing
[TRITA-NA-8003] N81-14656
Steepest edge algorithms in linear and nonlinear programming
[AD-A091608] N81-14662
Problems used in testing the efficiency and accuracy of the modified Gram-Schmidt least squares algorithm
[PB80-219777] N81-14672

Grid and metric generation on the assembly of locally bi-quadratic coordinate transformations N81-14698
Fast Generation of body conforming grids for 3-D N81-14706
Some aspects of adapting computational mesh to complex flow domains and structures with application to blown shock layer and base flow N81-14716
A two dimensional mesh verification algorithm N81-14720
A recursive approach to the implementation of enumerative methods
[MC-BW-116/80] N81-14728
Computing the perimeter of a set of rectangles
[MC-IW-121/79] N81-14729
A guide to the theory of gear's method for the numerical solution of systems of stiff ordinary differential equations
[NPL-DNACS-29/80] N81-14741
The weighted linear least squares problem: An interval analysis approach to rank determination
[SAND-80-1260] N81-14757
Linear programming and undiscounted stochastic games in which one player controls transitions
[MC-BW-122/80] N81-14777
Duality and the nonlinear roundtrip alpha center and covering problems on a tree
[MC-BW-123/80] N81-14778
Identification of nonlinear systems using parameter estimation techniques
[RR-117] N81-14779
The solution of manpower planning problems by the forward simplex method
[AD-A091521] N81-14916

ALIGNMENT
Troposcatter antenna positioner
[AD-A091778] N81-14198

ALKALINE BATTERIES
Research on alkaline zinc secondary electrodes with emphasis on model
[DOE/RL-90369/8] N81-14257

ALKANES
Liquid fuels production from biomass
[DOE/ET-200550/T1] N81-14121

ALKYLATION
Crosslinking of aromatic polyamides via pendant propargyl groups
[NASA-TM-81918] N81-14080

ALLOYS
MHD electrode development
[DOE/ET-15529/T1] N81-14875

ALTIMETERS
SEASAT altimeter atmospheric range correction
[AD-A091504] N81-14383

ALUMINUM
Large-scale integrated MOS circuits with small dimensions. Preparation of thin films
[BMFT-FB-T-79-55] N81-14226
Integrated RC-circuits in ALTA-technology on one substrate
[BMFT-FB-T-79-107] N81-14227
Ultrasonic aluminum wire bonding
[BDX-613-2485] N81-14330

ALUMINUM ALLOYS
Development of MIL-HDBK-5 design allowable properties for several aerospace materials --- mechanical properties of 2024 T42 extrusion and Ti6Al2Sn4Zr2Mo duplex annealed sheet
[AD-A091602] N81-14063
Static and dynamic response of an aluminum alloy panel having a central opening with combined in-plane biaxial static loading and acoustic excitation
[ISVR-TR-103] N81-14353
Spectrum fatigue testing of simple test specimens containing artificial defects --- aluminum alloy 7075-T6 clad sheets with open holes
[FAA-TN-HU-2108] N81-14354

ALUMINUM OXIDES
Effects of temperature, thermal exposure,and fatigue on an alumina/aluminum composite
[NASA-TP-1795] N81-14001
Production technology of beta-alumina ceramics for Na/S batteries
[BMFT-FB-T-79-57] N81-14402

AMIDES
Method for preparing addition type polyimide prepregs
[NASA-CASE-LAR-12054-2] N81-14078

AMMONIA
Advanced concepts test facility: Measurements and suggested test plan
[EPRI-CS-1530] N81-14466
Ammonia as a hydrogen energy-storage medium
[BNL-28293] N81-14477
Infrared emission spectroscopy of low pressure gaseous discharges, 3
[AD-A091744] N81-14540

AMORPHOUS MATERIALS
Mechanical properties of crystalline solids
[DOE/ER-02172/35] N81-14358
Amorphous thin films for solar cell application --- magnetron sputtering, ion implantation, and activation energy
[DOE/ET-23040/2] N81-14419

AMORPHOUS SEMICONDUCTORS
Electrodeposition of polycrystalline and amorphous silicon for photovoltaic applications
[DOE/ET-23046/3] N81-14443

AMPLITUDE MODULATION
Use of amplitude compandored SSB in the mobile radio bands
[PB80-215759] N81-14211
Convenience circuits --- amplitude compandored single sideband radios
[PB80-215783] N81-14213
Analysis, design, and performance evaluation of a single channel ACSB system
[PB80-215775] N81-14214
Spectral efficiency of FM and ACSB radios
[PB80-215767] N81-14215

ANALGESIA
Indometh acin-antihistamine combination for gastric ulceration control
[NASA-CASE-ARC-11118-2] N81-14613

ANALOG DATA
Evaluation of a CCD for analog delay
[AD-A091622] N81-14247
Improvements in the digitizing of analogue information
[TDB-343] N81-14919

ANALOG TO DIGITAL CONVERTERS
Improvements in the digitizing of analogue information
[TDB-343] N81-14919

ANALYSIS (MATHEMATICS)
BICYCLE: A comptuer code for calculating levelized life-cycle costs
[LA-8493-MS] N81-14341

ANALYZERS
Prototype chemiluminescent analyzer for measurement of hydrazines
[AD-A091678] N81-14032
Test and evaluation of an Energetics Science Incorporated Model 7660 electrochemical hydrazines analyzer
[AD-A091710] N81-14035

ANALYZING
Catalyst and process development for hygrogen preparation from future fuel cell feedstocks
[DOE/ET-15383-22] N81-14430

ANIONS
The chemistry of energetic fragments
[AD-A091823] N81-14031
Monte Carlo simulation of negative ion collection by a rocket borne mass spectrometer
[AD-A091721] N81-14542

ANISOTROPY
Ion-exosphere with anisotropic velocity distribution
[AERONOMICA-ACTA-A-215-1980] N81-14527

ANNUAL VARIATIONS
Meteorological factors affecting evaporation duct height climatologies
[AD-A091665] N81-14583
Site insolation and wind power characteristics: Technical report Midwest region
[DOE/CS-20160-01-VOL-4] N81-14586
Site insolation and wind power characteristics: Technical report Western region (south section)
[DOE/CS-20160-01-VOL-6] N81-14587
Site insolation and wind power characteristics: Technical report Western region (north section)
[DOE/CS-20160/01-VOL-5] N81-14588

ANODES
Development of molten carbonate fuel cell power plant
[DOE/ET-17019/1] N81-14436
MHD electrode development
[DOE/ET-15529/T1] N81-14875
Electrochemical and surface analysis of the reactive interfaces in the li(si)feS2 primary battery
[SAND-79-2155C] N81-14901

ANTENNA ARRAYS
Frequency translating phase conjugation circuit for active retrodirective antenna array --- microwave transmission
[NASA-CASE-NPO-14536-1] N81-14185
Coaxial phased array antenna
[NASA-CASE-MSC-16800-1] N81-14187
Calculation of traveling-wave wire antenna arrays with mutual impedances
[REPT-S-111] N81-14191
Troposcatter antenna positioner
[AD-A091778] N81-14198
AEGIS Near-field antenna test system, automated test system for phased array antennas
[AD-A091697] N81-14199
An automatic lightning detection system in northern California
[PB80-225592] N81-14597

ANTENNA DESIGN
Horn antenna design studies. Citations from the International Aerospace Abstract data base
[NASA-CR-163820] N81-14219

ANTENNA RADIATION PATTERNS
Coaxial phased array antenna
[NASA-CASE-MSC-16800-1] N81-14187
Horn antenna design studies. Citations from the International Aerospace Abstract data base
[NASA-CR-163820] N81-14219

ANTENNAS
Non-axisymmetric (m=plus or minus 1) Alfven waves in a cylindrical plasma
[IPF-80-1] N81-14851

ANTIHISTAMINICS
Indometh acin-antihistamine combination for gastric ulceration control
[NASA-CASE-ARC-11118-2] N81-14613

ANTIREFLECTION COATINGS
Photovoltaic mechanisms in polycrystalline thin-film silicon solar cells
[DOE/ET-23108/3] N81-14442

APEXES
Graphs of the three-dimensional state of stress at the vertex of a quarter-infinite crack in a half-space
[NTHD-123] N81-14351

APPLICATIONS OF MATHEMATICS
Hyperperfect numbers with more than two different prime factors
[MC-NW-87/80] N81-14746
Application of mathematics and statistics to biometrics, materials science, safety, environmental sciences, and related topics
[ORNL/CSD-61] N81-14760

APPROPRIATIONS
Department of Housing and Urban Development, and certain independent agencies appropriations, fiscal year 1981, part 2
[GPO-62-143] N81-14926

APPROXIMATION
Dual methods and approximation concepts in structural synthesis
[NASA-CR-3226] N81-14347
Grid generation for time dependent problems: Criteria and methods N81-14699
A general method of approximation particulary in L2
[FOA-C-10158-M8] N81-14750
High-energy positron ionization of adsorbed species in the impulse approximation
[AD-A091748] N81-14805

AQUIFERS
A 25 kW solar photovoltaic flat panel power supply for an electrodialysis water desalination unit in New Mexico
[DOE/ET-23061/1] N81-14444
Two well storage systems for combined heating and airconditioning by groundwater heatpumps in shallow aquifers
[LBL-11302] N81-14472

ARC HEATING
The use of magnesium fluoride windows in an argon wall-stabilized mini-arc
[NPL-QU-58] N81-14171

ARCHITECTURE
Predesign energy analysis: A new graphic approach to energy conscious design for buildings
[DOE/CS-0171] N81-14449

Low energy futures for the United States
[DOE/PE-0020] N81-14456

ARCHITECTURE (COMPUTERS)
How inefficient are stack-oriented abstract machines?
[MC-IW-123/79] N81-14630
The USAFA/8086. A state of the art microprocessor system. Volume 1: System hardware
[AD-A091772] N81-14637

ARGON
Influences of gaseous environment on low growth-rate fatigue crack propagation in steels
[DOE/ER-10389/1] N81-14066

ARGON LASERS
Some results on measurement of temperature and density in a flame by Raman spectroscopy N81-14019
NPL-PTB intercomparison of iodine-stabilized ion lasers
[NPL-MOM-42] N81-14308

ARGON PLASMA
Forced and free magnetoacoustic oscillations of toroidal argon plasmas
[IPF-8-3] N81-14852

ARID LANDS
ARID zone geosystems
[AD-A091689] N81-14379

ARMOR
Manufacturing Methods and Technology (MM/T) project to establish production techniques to manufacture rigid armor for radar antenna hardening
[AD-A091863] N81-14203

ARSENIDES
Boron arsenide thin film solar cell development
[DOE/ET-23011/1] N81-14445

ARTIFICIAL CLOUDS
Upper atmospheric winds
[AERONOMICA-ACTA-A-219-1980] N81-14529

ARTIFICIAL INTELLIGENCE
Advanced automation for space missions: Technical summary
[NASA-CR-163827] N81-14914

ASSEMBLING
Medium power silicon transistors --- fabrication and assembling
[BMFT-FB-T-79-160] N81-14237

ASTRONOMICAL TELESCOPES
Activities during 1979: Astronomical Research
[ISSN-0531-4496] N81-14936

ASTROPHYSICS
The faint object camera for the space telescope
[ESA-SP-1028] N81-14937
Fragmentation in rotating isothermal protostellar clouds
[NASA-TM-82229] N81-14938

ASYMPTOTES
On the expansion of confluent hypergeometric functions in terms of Bessel functions
[MC-TW-192/79] N81-14737
Branching processes with continuous state space allowing immigration
[MC-SW-67/80] N81-14763
Behadur efficiency and small-sample efficiency: A numerical study
[MC-SW-68/80] N81-14764

ASYMPTOTIC METHODS
Asymptotic analysis of a co-focal unstablet resonator without active media --- laser, cavity resonator
[CISE-1526] N81-14301
Grid evolution in time asymptotic problems N81-14719
On the geometry of multivariable root-loci
[RR-118] N81-14748

ASYMPTOTIC SERIES
On a class of nearly singular optimal control problems
[MC-TW-196/80] N81-14683

ATLANTIC OCEAN
Annual data and verification tabulation Atlantic tropical cyclones 1979
[PB80-226301] N81-14598
Catalog of sea state and wind speed in the South Atlantic Bight
[NASA-CR-156872] N81-14601

ATMOSPHERIC BOUNDARY LAYER
Development of an airborne lidar for characterizing particle distribution in the atmosphere
[EPRI-EA-1538] N81-14514
One-dimensional simulation of temperature and moisture in atmospheric and soil boundary layers
[NASA-CR-163841] N81-14531

ATMOSPHERIC CHEMISTRY
Negative ion chemistry in the terrestrial D-region and signal flow graph theory
[AERONOMICA-ACTA-A-217-1980] N81-14528
Air chemistry measurements in the lower atmosphere over Sweden: Data evaluation
[AC-45] N81-14533
Chemical kinetic and photochemical data sheets for atmospheric reactions
[AD-A091631] N81-14541
Monte Carlo simulation of negative ion collection by a rocket borne mass spectrometer
[AD-A091721] N81-14542
Trace constituents in the middle atmosphere by high resolution UV spectroscopy N81-14947

ATMOSPHERIC CIRCULATION
Latent heat induced divergence and the ultra-long waves of the subtropics and midlatitudes
[AD-A091408] N81-14585
An objective method for determining the generalized transport tensor for two dimensional Eulerian models
[AD-A091732] N81-14756

ATMOSPHERIC COMPOSITION
Mitigating strategies for CO2 problems
[DOE/EV-10281/T2] N81-14511
Role of Organic Soils in the World Carbon: Problem Analysis and Research Needs
[DOE/EV-10040/2] N81-14516

ATMOSPHERIC DENSITY
Evaluation of atmospheric density models and preliminary functional specifications for the Langley Atmospheric Information Retrieval System (LAIRS)
[NASA-CR-159374] N81-14554

ATMOSPHERIC DIFFUSION
Review and developments of dissemination models for airborne carbon fibers
[NASA-TM-80216] N81-14002

ATMOSPHERIC EFFECTS
Environmental impacts of the satellite power system (SPS) on the middle atmosphere
[NASA-TM-82228] N81-14508

ATMOSPHERIC ELECTRICITY
Observing lightning from ground-based and airborne stations N81-14566
Aeronautical concerns and National Aeronautics and Space Administration atmospheric electricity projects N81-14567

ATMOSPHERIC ENTRY
Thermal stress response of General Purpose Heat Source (GPHS) aeroshell material N81-14167
Numerical methods in fluid flow problems. Citations from the NTIS data base
[PB80-814189] N81-14286

ATMOSPHERIC IONIZATION
Proceedings of the workshop on Modification of the Upper Atmosphere by Satellite Power System (SPS) Propulsion Effluents
[CONF-7906180] N81-14548

ATMOSPHERIC MODELS
Security assessment of power systems
[DOE/ET-29100/11] N81-14447
Evaluation of atmospheric density models and preliminary functional specifications for the Langley Atmospheric Information Retrieval System (LAIRS)
[NASA-CR-159374] N81-14554
Some considerations about wind predictions over sea using a 'limited area model' based on primitive equations
[KNMI-V-349] N81-14577

ATMOSPHERIC PRESSURE
Unidirectional composites as electrodes/preionization sources for CO2 tea lasers
[AD-A091407] N81-14012
Long term variability of windspeed
[AD-A091802] N81-14581

ATMOSPHERIC SCATTERING
Lidar observations at 0.7-micrometers and 10.6 micrometers wavelengths during smoke week 2
[AD-A091561] N81-14382
SEASAT altimeter atmospheric range correction
[AD-A091504] N81-14383

ATMOSPHERIC SOUNDING
Wind tunnel tests of a Gerdien capacitor vehicle combination
[AD-A091719] N81-13986
ISIS topside sounder data gathered on Kwajalein Atoll during the summers of 1977 and 1978
[AD-A091845] N81-14539
A preliminary look at AVE-SESAME 4 conducted on 9-10 May 1979
[NASA-TM-78314] N81-14552
AVE-SESAME IV: 25 mb sounding data
[NASA-TM-78315] N81-14553
Surface based remote sensing in marine air. Extensive analysis of echoes by several sensors reveals evolutionary atmospheric processes related to weather capable of affecting naval operations
[AD-A091518] N81-14584

ATMOSPHERIC TEMPERATURE
A new tropopause definition from simultaneous ozone temperature profiles
[AD-A091718] N81-14543
Aircraft icing instrumentation: Unfilled needs --- rotary wing aircraft N81-14560

ATMOSPHERIC TURBULENCE
Survey of Workshops on Meteorological and Environmental Inputs to Aviation Systems N81-14556
Turbulence: From a pilot's viewpoint N81-14561
Remote probing of wind and wind shears N81-14564
Solar energy meteorological research and training site, region 5
[DOE/ET-20172] N81-14590
Statistics of wind fluctuations over complex terrain
[DOE/ET-20560/1] N81-14593
Meteorological measurement system for support of atmospheric propagation studies
[UCRL-84547] N81-14594

ATMOSPHERICS
Improvement of the sensitivity of millimeter wave radio telescopes by synchronous tracking
[REPT-S-108] N81-14935

ATOMIC ENERGY LEVELS
Analysis of spectral diffusion of localized triplet spin transitions within an inhomogeneous profile
[AD-A091714] N81-14033

ATOMIC EXCITATIONS
Experimental studies of electron impact depopulation of excited states of atoms: Applications to laser development for fusion and isotope separation
[DOE/ES-04199/1] N81-14816
Measurement of visible and UV emission from Energetic Neutral Atom Precipitation (ENAP), on Spacelab N81-14948

ATOMIZING
Production of high purity metal and metal-alloy powders free of oxygen for subsequent processing of high-qualified sintering and semi-finished parts
[BMFT-FB-T-79-173] N81-14058

AUDIOMETRY
Tables relating pure-tone audiometric threshold to age
[NPL-AC-94] N81-14616

AUDITORY PERCEPTION
Activities of the Institute of Sound and Vibration Research for the year ending March 1980 N81-14960

AURORAL ARCS
The quiet-time pattern of auroral arcs as a consequence of magnetospheric convection
[DMI-GEOPHYS-PAPERS-R-56] N81-14536

AURORAS
The swept angle retarding mass spectrometer: Initial results from the Michigan auroral probe sounding rocket
[NASA-TM-78317] N81-14530
Rocket measurements of electric fields, electron density and temperature during the three phases of auroral substorms
[TRITA-EPP-79-22] N81-14859

AUTOCORRELATION
General results, time series in M dimensions
[AD-A091578] N81-14766
The determination of seasonal ARMA models
[AD-A091516] N81-14784
Modeling seasonal ARMA processes
[AD-A091515] N81-14785

AUTOMATA THEORY
Time and space complexity of inside-out macro languages
[MC-IW-141/80] N81-14658

Advanced automation for space missions: Technical summary
[NASA-CR-163827] N81-14914

AUTOMATIC CONTROL
Gas turbine engines and transmissions for bus demonstration programs
[COO-4867-07] N81-14329
Automation of a maintainability prediction
[AD-A091787] N81-14339

AUTOMATIC TEST EQUIPMENT
AEGIS Near-field antenna test system, automated test system for phased array antennas
[AD-A091697] N81-14199

AUTOMATION
An automated procedure for composition of severe weather watch areal redefining statements
[PB80-225584] N81-14595

AUTOMOBILE ENGINES
Applicability of advanced automotive heat engines to solar thermal power
[NASA-TM-81658] N81-14397

AUTOMOBILE FUELS
Ethanol production for automotive fuel usage
[DOE/ID-12050/3] N81-14123

AUTOREGRESSIVE PROCESSES
Time series in m dimensions: Spatial models
[AD-A091734] N81-14773

AVALANCHE DIODES
Planar transistors and impatt diodes with ion implantation
[BMFT-FB-T-79-16] N81-14224

AVIONICS
An assessment of General Aviation utilization of advanced avionics technology
[NASA-CR-159328] N81-13941

AXES OF ROTATION
Steering law for parallel mounted double-gimbaled control moment gyros. Revision A
[NASA-TM-82390] N81-13991

AXIAL LOADS
Experiments with thin-walled, isotropic cones subjected to axial load, axial load combined with constant internal pressure and external hydrostatic pressure
[DFVLR-MITT-80-02] N81-14348

AXISYMMETRIC BODIES
An axisymmetric, strong-interaction procedure to include large normal pressure gradients
[AD-A091820] N81-14274

AZINES
Perfluoroalkyl polytriazines containing pendent iododifluoromethyl groups
[NASA-CASE-ARC-11241-1] N81-14016

B

BACKGROUND NOISE
Improvement of the sensitivity of millimeter wave radio telescopes by synchronous tracking
[REPT-S-108] N81-14935

BACTERIA
Photoproduction of hydrogen by membranes of green photosynthetic bacteria
[BNL-28334] N81-14129
The control of microbial contamination of cutting fluid ZX-1
[MQAD-TP-727] N81-14338
A multidisciplinary research program directed toward utilization of solar energy through bioconversion of renewable resources
[DOE/ER-00888/3] N81-14425

BAFFLES
Low-speed wind-tunnel tests of two weathercocking sensors
[WSRL-0171-TM] N81-14575

BALANCING
Mass synthesis for multiple balancing criteria of complex, planar mechanisms N81-14321

BALTIC SEA
The ability of passive microwave systems to detect sea ice --- Gulf of Bothnia, Baltic Sea
[REPT-S-113] N81-14374

BAND STRUCTURE OF SOLIDS
Electronic and optical properties and modeling of intercalated graphite
[AD-A091858] N81-14009

BAROCLINIC INSTABILITY
Internal tides and inertial oscillations as inferred from current and temperature measurements in the equatorial Pacific
[PB80-225568] N81-14603

BARYONS
Research in elementary particle physics
[DOE/ER-03230/T1] N81-14813

BASALT
Hotspots, basalts and the evolution of the mantle N81-14368
Basaltic volcanism contribution N81-14369

BASE FLOW
Some aspects of adapting computational mesh to complex flow domains and structures with application to blown shock layer and base flow N81-14716

BASE PRESSURE
Theoretical prediction of the base pressure for two-dimensional turbulent base flows at supersonic velocities
[DFVLR-FB-80-19] N81-13928

BASIC (PROGRAMMING LANGUAGE)
An automatic method for checking the internal consistency of activity coefficients of binary mixtures
[NPL-CHEM-104] N81-14020

BEAM CURRENTS
Tokamak currents driven by weak electrostatic waves
[DOE/ET-53036/18] N81-14880

BEARINGS
Solid lubricants: Graphite, polymers, fluorides, and general studies. Citations from the Engineering Index data base
[PB80-815673] N81-14101
Service life determination for the UH-60-A (UTTAS) helicopter elastomeric bearings
[AD-A091756] N81-14324
Improved capabilities to detect incipient bearing failures
[AD-A091687] N81-14325

BEDS (PROCESS ENGINEERING)
Catalyst and process development for hydrogen preparation from future fuel cell feedstocks
[DOE/ET-15383/18] N81-14463
Heat transfer modeling for a non-fluidized particulate bed
[EGG/ENI-143] N81-14910

BELLOWS
On the improvement of miniature pyrotechnic devices for space application
[ESA-CR(P)-1296] N81-14105

BENDING MOMENTS
The inelastic bending of a nickel beam at several temperatures: Experiment and prediction --- prismatic bars
[DOE/ER-02733/29] N81-14362

BESSEL FUNCTIONS
On the expansion of confluent hypergeometric functions in terms of Bessel functions
[MC-TW-192/79] N81-14737

BIAS
Biased regression: A ten year perspective
[AD-A091551] N81-14770

BIBLIOGRAPHIES
Aeronautical Engineering: A continuing bibliography with indexes, supplement 128, November 1980
[NASA-SP-7037(128)] N81-13914
Aircraft maintenance. Citations from the International Aerospace Abstracts data base
[PB80-815905] N81-13917
Inertial navigation and guidance. Citations from the International Aerospace Abstracts data base
[NASA-CR-163838] N81-13946
Microwave landing systems. Citations from the Engineering Index data base
[PB80-814643] N81-13947
Microwave landing systems. Citations from the NTIS data base
[PB80-814635] N81-13948
Technological forecasting--aircraft design. Citations from the International Aerospace data base
[PB80-815970] N81-13957
Electrochemical methods of chemical analysis. Citations from the NTIS data base
[PB80-815053] N81-14057
Cryogenic aging of metals. Citations from the NTIS data base
[PB80-808868] N81-14075
High temperature lubricants and oils. Citations from the Engineering Index data base
[PB80-815590] N81-14096
High temperature lubricants and oils. Citations from the NTIS data base
[PB80-815582] N81-14097
High temperature lubricants and oils. Citations from the Engineering Index data base
[PB80-815574] N81-14098
Solid lubricants. Citations from the American Petroleum Institute data base
[PB80-816010] N81-14099
Solid lubricants. Citations from the NTIS data base
[PB80-815665] N81-14100
Solid lubricants: Graphite, polymers, fluorides, and general studies. Citations from the Engineering Index data base
[PB80-815673] N81-14101
Solid lubricants: Molybdenum compounds. Citations from the Engineering Index data base
[PB80-815681] N81-14102
Polycarboranes. Citations from the NTIS data base
[PB80-814163] N81-14136
Single sideband communications. Citations from the NTIS data base
[PB80-814262] N81-14209
Single sideband communications. Citations from the Engineering Index data base
[PB80-814270] N81-14210
Light communication systems. Citations from the NTIS data base
[PB80-815319] N81-14218
Horn antenna design studies. Citations from the International Aerospace Abstract data base
[NASA-CR-163820] N81-14219
Computer aided design of microcircuits. Citations from the NTIS data base
[PB80-814296] N81-14258
Computer aided design of microcircuits. Citations from the Engineering Index data base
[PB80-814304] N81-14259
Computer networks. Citations from the NTIS data base
[PB80-814007] N81-14260
Superconducting magnets. Citations from NTIS data base
[PB80-816028] N81-14262
Bibliography of fluid density: Experimental determinations on single substances over a temperature range exceeding 40 K
[NPL-CHEM-106] N81-14264
Numerical methods in fluid flow problems. Citations from the NTIS data base
[PB80-814171] N81-14285
Numerical methods in fluid flow problems. Citations from the NTIS data base
[PB80-814189] N81-14286
Hot film anemometry. Citations from the NTIS data base
[PB80-814288] N81-14297
Laser cutting and machining: Nonmetals. Citations from the Engineering Index data base
[PB80-814437] N81-14309
Laser cutting and machining: Metals Citations from the Engineering Index data base
[PB80-814445] N81-14310
Dye lasers. Citations from the NTIS data base
[PB80-813819] N81-14311
Dye lasers. Citations from the NTIS data base
[PB80-813801] N81-14312
Hydrogen fluoride and deuterium fluoride lasers. Citations from the International Aerospace Abstracts data base
[PB80-815871] N81-14313
Ultraviolet lasers. Citations from the International Aerospace Abstracts data base
[NASA-CR-163831] N81-14314
X-ray lasers. Citations from the International Aerospace Abstracts data base
[NASA-CR-163834] N81-14315
Neodymium YAG lasers. Citations from the International Aerospace Abstracts data base
[NASA-CR-163835] N81-14316
Laser welding. Citations from the Engineering Index data base
[PB80-815202] N81-14335

Earth Resources: a continuing bibliography with indexes
[NASA-SP-7041(27)] N81-14371
California Water Resources Center: chronicle of research, 1957-1980 --- bibliographies
[PB80-222276] N81-14384
Remote sensing applied to pollution monitoring. Citations from the International Aerospace Abstracts data base
[NASA-CR-163830] N81-14388
Energy information referral directory, second quarter 1980
[DOE/EIA-0205/80-2Q] N81-14424
Solar ponds. Citations from the Engineering Index data base
[PB80-814452] N81-14493
Solar ponds. Citations from the NTIS data base
[PB80-814460] N81-14494
Geothermal energy. Citations from the Engineering Index data base
[PB80-814692] N81-14495
Geothermal energy. Citations from the Engineering Index data base
[PB80-814684] N81-14496
Geothermal energy: Technology and general studies. Citations from the NTIS data base
[PB80-814676] N81-14497
Trace metals and Stationary Conventional Combustion Processes. Volume 2: Bibliography
[PB80-216179] N81-14520
Maneuvering aircraft: Noise pollution and control. Citations from the NTIS data base
[PB80-815566] N81-14525
Urban air pollution. Citations from the NTIS data base
[PB80-814411] N81-14526
Aerospace Medicine and Biology: A continuing bibliography with indexes, supplement 212
[NASA-SP-7011(212)] N81-14611
Stress factors on pilot performance. Citations from the International Aerospace Abstracts data base
[NASA-CR-163836] N81-14623
Trends in computer technology. Citations from the NTIS data base
[PB80-815129] N81-14645
Applications of the Fast Fourier Transform. Citations from the NTIS data base
[PB80-815491] N81-14677
Computer networks. Citations from the NTIS data base
[PB80-814015] N81-14679
Control theory. Citations from the NTIS data base
[PB80-814395] N81-14689
Random variate generation: A survey
[AD-A091343] N81-14774

BINARY ALLOYS
Low alloy steels that minmize the hydrogen-carbide reaction, part 1
[DOE/ER-70296/T1] N81-14069

BINARY MIXTURES
An automatic method for checking the internal consistency of activity coefficients of binary mixtures
[NPL-CHEM-104] N81-14020

BIOCONVERSION
A multidisciplinary research program directed toward utilization of solar energy through bioconversion of renewable resources
[DOE/ER-00888/3] N81-14425
Bioengineering aspects of inorganic carbon supply to mass algal cultures
[DOE/ET-20604/1] N81-14608

BIODEGRADATION
Liquid fuels production from biomass
[DOE/ET-200550/T1] N81-14121

BIOENGINEERING
Subcutaneous electrode structure
[NASA-CASE-ARC-11117-1] N81-14612

BIOMASS ENERGY PRODUCTION
Liquid fuels production from biomass
[DOE/ET-200550/T1] N81-14121
Synthetic fuels and the environment: An environmental and regulatory impact analysis
[DOE/EV-0087] N81-14122
Ethanol production for automotive fuel usage
[DOE/ID-12050/3] N81-14123
Progress in wood gasification at the University of Missouri-Rolla
[CONF-800973-1] N81-14128
Methane or methanol via catalytic gasification of biomass
[PNL-SA-8049] N81-14131
Bioconversion of biomass gasifier product gases to organic chemicals
[PB80-216641] N81-14135
Solar energy: Program summary document
[DOE/CS-0050] N81-14428
Assessment of industrial activity in the utilization of biomass for energy
[DOE/PE-70090/01] N81-14457

BIOMETRICS
Application of mathematics and statistics to biometrics, materials science, safety, environmental sciences, and related topics
[ORNL/CSD-61] N81-14760

BIOPHYSICS
Life from a plantary perspective: Fundamental issues in global ecology N81-14503

BLADE TIPS
Wind-tunnel test of an articulated helicopter rotor model with several tip shapes
[NAS´-TM-80080] N81-13918

BLANKETS (FUSION REACTORS)
The effects of radiating impurities and Boehm transport in a cool plasma mantle
[TRITA-PFU-80-05] N81-14865

BLAST LOADS
Design criteria for deflection capacity of conventionally reinforced concrete slabs. Phase 3: Summary of design criteria and design and construction details; design examples
[AD-A091616] N81-14177
An analysis of the characteristics of Rayleigh waves produced by surface explosions
[AD-A091806] N81-14207

BLOCKS
Stress intensity factors for cracks with circular and elliptic crack fronts, determined by 3D finite element methods --- corner, surface, and embedded cracks in cuboid blocks
[PNR-90035] N81-14349

BLOWERS
Noise and noise abatement in fans and blowers: A review
[DFVLR-FB-80-16] N81-14796

BLUNT BODIES
A study of the sonic-boom characteristics of a blunt body at a Mach number of 6
[NASA-TP-1787] N81-13915

BOATTAILS
Numerical solutions of the Navier-Stokes equations for transonic afterbody flows
[NASA-TP-1784] N81-13919

BODY FLUIDS
Micro-fluid exchange coupling apparatus
[NASA-CASE-ARC-11114-1] N81-14605

BODY-WING CONFIGURATIONS
Three dimensional spline-generated coordinate transformations for grids around wing-body configurations N81-14707

BOEING AIRCRAFT
Testimony of Richard W. Taylor, Vice President and Special Assistant to the President, and Eugene A. Bara, Chief Engineer, Payloads Systems, Boeing Commercial Airplane Company N81-13936

BOILERS
Conversion to coal and coal/oil firing
[ICTS/TR-07] N81-14405

BOLTZMANN TRANSPORT EQUATION
A time-discrete Boltzmann equation
[CTH-MATH-1980-1] N81-14782

BOOLEAN ALGEBRA
Refinements to the Boolean approach to automatic data editing
[ORNL/TM-7156] N81-14925

BOOSTER RECOVERY
Space shuttle solid rocket booster recovery subsystem
[NASA-TM-82389] N81-13990

BOOSTER ROCKET ENGINES
The compression moulding of composite aero engine components with elevated thermal stability
[PNR-90036] N81-13962

BORN APPROXIMATION
Moment theory investigations of born approximation scattering phenomena N81-14821

BORON
Boron arsenide thin film solar cell development
[DOE/ET-23011/1] N81-14445
Advanced ion implantation techniques
[BMFT-FB-T-79-37] N81-14897

BORON CARBIDES
Elastic moduli of boron carbide/copper composites from minus 40 deg C to 800 deg C by ultrasonic methods
[SAND-80-0881] N81-14356

BOUNDARIES
Generation of orthogonal boundary-fitted coordinate systems N81-14703
Fast Generation of body conforming grids for 3-D N81-14706
Conformal mapping of multiply connected regions onto regions with specified boundary shapes N81-14712
Effects of dimensionality and boundary conditions on thermal calcuations
[UCID-18681] N81-14911

BOUNDARY LAYER CONTROL
A computer program for the design and analysis of low-speed airfoils, supplement
[NASA-TM-81862] N81-13921
Active flutter suppression on an F-4F aircraft with external stores using already existing control surfaces
[MBB-FE-17/S/PUB/24] N81-13972

BOUNDARY LAYER FLOW
One-dimensional simulation of temperature and moisture in atmospheric and soil boundary layers
[NASA-CR-163841] N81-14531
A new tropopause definition from simultaneous ozone temperature profiles
[AD-A091718] N81-14543

BOUNDARY LAYER STABILITY
Free-stream disturbances, continuous eigenfunctions, boundary-layer instability and transition
[NASA-CR-163828] N81-14266
Stability of three-dimensional shear flows: Criteria for inviscid disturbance excitation
[DFVLR-FB-80-05] N81-14272

BOUNDARY LAYER TRANSITION
Free-stream disturbances, continuous eigenfunctions, boundary-layer instability and transition
[NASA-CR-163828] N81-14266

BOUNDARY LAYERS
Numerical methods in fluid flow problems. Citations from the NTIS data base
[PB80-814189] N81-14286

BOUNDARY VALUE PROBLEMS
Numerical grid generation techniques --- conference
[NASA-CP-2166] N81-14690
Grid generation using differential systems techniques N81-14692
Mesh generation using algebraic techniques N81-14693
Generation of boundary and boundary-layer fitting grids N81-14694
Finite difference grid generation by multivariate blending function interpolation N81-14696
Component-adaptive grid embedding N81-14697
Grid and metric generation on the assembly of locally bi-quadratic coordinate transformations N81-14698
Generations of orthogonal surface coordinates N81-14700
An adaptive computation mesh for the solution of singular perturbation problems N81-14701
A new coordinate transformation for turbulent boundary layer flows N81-14702
Grid generation using coarse, smooth finite elements N81-14705
Boundary-fitted coordinates for regions with highly curved boundaries and reentrant boundaries N81-14709
Boundary-fitted coordinate systems for arbitrary computational regions N81-14713
Effect of grid system on finite element calculation N81-14715
A note on C(0) Galerkin methods for two point boundary problems
[MC-NW-73/79] N81-14730
On the economization of stabilized Runge-Kutta methods with applications to parabolic initial value problems
[MC-NW-74/79] N81-14731
How many jumps? Variational characterization of the limit solution of a singular perturbation problem
[MC-TW-195/79] N81-14739

A note on a differential system constructed by H. O. Kreiss
[TRITA-NA-8004] N81-14742
A general method of approximation particulary in L2
[FOA-C-10158-M8] N81-14750
Numerical methods for initial value problems
[AD-A091502] N81-14754

BRAGG ANGLE
Film transporting curved crystal X-ray spectrometer
[SAND-80-1286] N81-14294

BRAIN
Processing of sequential and holistic stimuli in left and right visual fields
[AD-A091588] N81-14619

BRANCHING (MATHEMATICS)
Branching processes with continuous state space allowing immigration
[MC-SW-67/80] N81-14763

BRIGHTNESS TEMPERATURE
The ability of passive microwave systems to detect sea ice --- Gulf of Bothnia, Baltic Sea
[REPT-S-113] N81-14374

BROADBAND
Ray theory to predict the propagation of broadband fan noise
[PNR-90030] N81-14794

BROMIDES
Bromine as a partial oxidant. Oxidation state and charge transport in brominated nickel and palladium bisdiphenylglyoximates: A comparison with the ionidated materials and resonance Raman structure spectra correlations for polybromides
[AD-A091534] N81-14037

BROMINE
Bromine as a partial oxidant. Oxidation state and charge transport in brominated nickel and palladium bisdiphenylglyoximates: A comparison with the ionidated materials and resonance Raman structure spectra correlations for polybromides
[AD-A091534] N81-14037

BUBBLE MEMORY DEVICES
Bubble memory module
[NASA-CR-3380] N81-13993

BUBBLES
Measurements of microwave transmission characteristics through various configurations of fluidized bed materials
[DOE/MC-14143/T1] N81-14208

BUCKLING
Experiments with thin-walled, isotropic cones subjected to axial load, axial load combined with constant internal pressure and external hydrostatic pressure
[DFVLR-MITT-80-02] N81-14348

BUMPY TORUSES
Confinement and heating of plasmas
[ISSN-0547-1567] N81-14848
Microwave heating of the ELMO bumpy torus relativistic electron ring
[DOE/ER-53092/13] N81-14874
Electron heating and confinement measurements in EBT-S using Thompson scattering
[ORNL/TM-7437] N81-14887

BURNERS
Efficient utilization of alternate fuels: Development of models for the prediction of interchangeability, design, and performance of gas burner/combustor systems
[PB80-218282] N81-14134

BURNING RATE
Derivation of the solid propellant response function
[VTH-M-366] N81-14104
Combustion mechanisms of solid propellants
[AD-A091857] N81-14108

C

C BAND
Use of amplitude compandored SSB in the mobile radio bands
[PB80-215759] N81-14211

CADMIUM TELLURIDES
Thin film cadmium telluride solar cells
[DOE/ET-23009/T10] N81-14438
Thin film cadmium telluride solar cells
[DOE/ET-23009/T11] N81-14446
Controlled cadmium telluride thin films for solar cells applications
[SERI/PR-9131-1-T1] N81-14482
Growth of HgCdTe by modified molecular beam epitaxy
[AD-A091822] N81-14899

CALCIUM
Calcium/calcium chromate thermal battery and thermal battery assignment at the General Electric Neutron Devices Department
[GEPP-TIS-529] N81-14468

CALIBRATING
The development of potential thin standards for calibration of X-ray fluorescence spectrometry
[PB80-220239] N81-14053

CALIFORNIA
Southern California aviation system study
[PB80-215544] N81-13916
California Water Resources Center: chronicle of research, 1957-1980 --- bibliographies
[PB80-222276] N81-14384
Visibility in California
[PB80-216765] N81-14518
A survey of acid precipitation in northern California
[PB80-225311] N81-14523
An automatic lightning detection system in northern California
[PB80-225592] N81-14597

CAMERAS
A camera device for the measurement of pin bowing in AGR fuel elements
[TDB-350] N81-14291
The faint object camera for the space telescope
[ESA-SP-1028] N81-14937

CANARD CONFIGURATIONS
Computational aerodynamic design tools and techniques used at fighter development
[MBB-FE-122/S/PUB/13] N81-13950

CANOPIES
A contribution to stabilization of flight vehicle parachute systems
[DFVLR-MITT-80-05] N81-13926

CAPACITORS
Wind tunnel tests of a Gerdien capacitor vehicle combination
[AD-A091719] N81-13986
Development of a high energy density capacitor for plasma thrusters
[AD-A091839] N81-13995
Integrated RC-circuits in ALTA-technology on one substrate
[BMFT-FB-T-79-107] N81-14227
Basic concepts for integrated RC networks and hybrid circuits on organic substrate foils
[BMFT-FB-T-79-87] N81-14231

CARBIDES
Low alloy steels that minmize the hydrogen-carbide reaction, part 1
[DOE/ER-70296/T1] N81-14069

CARBON
An X-ray photoelectron spectroscopic examination of surfaces of some thermosetting resins and carbon fibre composites
[RAE-TM-MAT-347] N81-14007
Bioengineering aspects of inorganic carbon supply to mass algal cultures
[DOE/ET-20604/1] N81-14608

CARBON DIOXIDE
Bioconversion of biomass gasifier product gases to organic chemicals
[PB80-216641] N81-14135
Metabolic rate measurement system
[NASA-CR-160893] N81-14614
Development of a preprototype sabatier CO2 reduction subsystem
[NASA-CR-160885] N81-14624

CARBON DIOXIDE CONCENTRATION
Global energy futures and the carbon dioxide problem N81-14502
Mitigating strategies for CO2 problems
[DOE/EV-10281/T2] N81-14511
Role of Organic Soils in the World Carbon: Problem Analysis and Research Needs
[DOE/EV-10040/2] N81-14516

CARBON DIOXIDE LASERS
Unidirectional composites as electrodes/preionization sources for CO2 tea lasers
[AD-A091407] N81-14012
Fusion driver study --- pulsed lasers system for inertial confinement fusion
[DOE/DP-40006/1] N81-14872

CARBON FIBER REINFORCED PLASTICS
Constant-amplitude and flight-by-flight tests on CFRP specimens
[MBB-FE-2/S/PUB-26] N81-14006

CARBON FIBERS
Review and developments of dissemination models for airborne carbon fibers
[NASA-TM-80216] N81-14002
A resin injection technique for the fabrication of aero engine composite components
[PNR-90024] N81-14004

CARBON MONOXIDE
Bioconversion of biomass gasifier product gases to organic chemicals
[PB80-216641] N81-14135

CARBON-CARBON COMPOSITES
Thermal stress response of General Purpose Heat Source (GPHS) aeroshell material N81-14167
Space Shuttle Orbiter nose cap and wing leading edge certification test program N81-14168

CARBONATES
Development of molten carbonate fuel cell power plant technology
[DOE/ET-15440/2] N81-14432
Effects of several trace contaminants on fuel cell performance
[DOE/METC/RI-80/16] N81-14455

CARBORANE
Polycarboranes. Citations from the NTIS data base
[PB80-814163] N81-14136

CARIBBEAN SEA
Seasat views North America, the Caribbean, and Western Europe with imaging radar
[NASA-CR-163825] N81-14372

CAROTENE
The relationship between differential areas and concentration in derivative absorption spectrophotometry
[DRIC-TRANS-6127] N81-14029

CARTESIAN COORDINATES
Graphs of the three-dimensional state of stress at the vertex of a quarter-infinite crack in a half-space
[NTHD-123] N81-14351
Grid generation using classical techniques N81-14691
Grid generation using differential systems techniques N81-14692
Component-adaptive grid embedding N81-14697
Boundary-fitted coordinates for regions with highly curved boundaries and reentrant boundaries N81-14709
Some aspects of adapting computational mesh to complex flow domains and structures with application to blown shock layer and base flow N81-14716
Curvilinear grids for sinuous river channels N81-14724

CASCADE FLOW
An electrostatic analog for generating cascade grids N81-14695
Generation of C-type cascade grids for viscous flow computation N81-14721

CASSEGRAIN OPTICS
The faint object camera for the space telescope
[ESA-SP-1028] N81-14937

CATALYSIS
Combined Electrolysis Catalytic Exchange (CECE)
[MLM-2774] N81-14051
Crossed reaction networks in the catalytic hydrodenitrogenation of synthetic liquid fuels
[DOE/PC-30094/1] N81-14124

CATALYSTS
Polymer activated catalysts
[AD-A091750] N81-14085
Investigation of sulfur-tolerant catalysts for selective synthesis of hydrocarbon liquids from coal derived gases
[DOE/ET-14809/3] N81-14118
Catalytic combustion of coal-derived liquids
[NASA-TM-81594] N81-14396
Catalyst and process development for hydrogen preparation from future fuel cell feedstocks
[DOE/ET-15383/18] N81-14463
Development of a preprototype sabatier CO2 reduction subsystem
[NASA-CR-160885] N81-14624

CATALYTIC ACTIVITY
Methane or methanol via catalytic gasification of biomass
[PNL-SA-8049] N81-14131

CATEGORIES
Current aircraft survey (approach speeds, gross weights, and Dimensions)
[PB80-225691] N81-13956

CATHODES
Development of molten carbonate fuel cell power plant
[DOE/ET-17019/1] N81-14436
Electrochemical and surface analysis of the reactive interfaces in the li(si)feS2 primary battery
[SAND-79-2155C] N81-14901

CAVITY RESONATORS
Asymptotic analysis of a co-focal unstablet resonator without active media --- laser, cavity resonator
[CISE-1526] N81-14301

CEILINGS (ARCHITECTURE)
Demonstration of an advanced solar garden with a water ceiling
[DOE/R5-10122/2] N81-14459

CEILINGS (METEOROLOGY)
Ceiling and visibility instrumentation within government agencies N81-14565
Very short range forecasts of visibility and ceiling N81-14570

CELLULOSE
A multidisciplinary research program directed toward utilization of solar energy through bioconversion of renewable resources
[DOE/ER-00888/3] N81-14425

CENTER OF MASS
Separability of center of mass and relative motion of hydrogen in very strong magnetic fields
[DOE/ER-01545/284] N81-14907

CENTRAL PROCESSING UNITS
Recurrent ultracomputers are not log n-fast
[MC-IW-118/79] N81-14627

CERAMIC BONDING
Joining of ceramics for high performance energy systems
[DOE/ET-15359/1] N81-14092

CERAMIC COATINGS
Ceramic turbine components research and development. Part 2: Evaluation of MCrAlY/ZrO2 (Y2O3) thermal-barrier coatings exposed to simulated gas turbine environments
[EPRI-AP-1539-PT-2] N81-14331

CERAMIC HONEYCOMBS
Improved ceramic heat exchanger materials
[NASA-CR-159678] N81-14082

CERAMICS
Some aspects of materials and structures engineering with ceramics for engine applications
[AD-A091547] N81-13967
Mechanical characterization of Si3N4 N81-14005
Improved ceramic heat exchanger materials
[NASA-CR-159678] N81-14082
Plastic deformation in oxide ceramics
[DOE/ER-04217/T1] N81-14091
Joining of ceramics for high performance energy systems
[DOE/ET-15359/1] N81-14092
Strength and fracture characteristics of HTGR thermal barrier ceramics
[GA-A-15929] N81-14094
Application of fracture mechanics in assuring against fatigue failure of ceramic components
[PB80-213549] N81-14095
Ceramic heat pipe development
[DOE/TIC-11293] N81-14279
Production technology of beta-alumina ceramics for Na/S batteries
[BMFT-FB-T-79-57] N81-14402

CERENKOV COUNTERS
Performance characteristics of large aperture, ten-cell, atmospheric pressure isobutane Cerenkov counters
[DOE/ER-14529/1] N81-14509

CERMETS
Work function investigations at electrodes with adsorbed layers by measuring contact potential differences in vapor atmosphere
[DFVLR-FB-79-22] N81-14242

CERTIFICATION
Information and guidelines for a proposed laboratory accreditation and product certification program for photovoltaic energy conversion systems
[PB80-217615] N81-14501

CHANNEL FLOW
Curvilinear grids for sinuous river channels N81-14724

CHARACTERIZATION
An analytical chemical system for the determination of heavy metals and organic compounds
[DOE/EV-04320/1] N81-14045

CHARGE COUPLED DEVICES
Evaluation of a CCD for analog delay
[AD-A091622] N81-14247
A 32 kbit CCD-memory-device
[BMFT-FB-T-79-105] N81-14634

CHARGE EFFICIENCY
Research, development, and demonstration of nickel iron batteries for electric vehicle propulsion
[ANL/OEPM-79-14] N81-14932

CHARGE EXCHANGE
Cross sections for charge transfer collisions involving hydrogen atoms --- fusion plasmas
[IPPJ-AM-15] N81-14847

CHARGE TRANSFER
Bromine as a partial oxidant. Oxidation state and charge transport in brominated nickel and palladium bisdiphenylglyoximates: A comparison with the ionidated materials and resonance Raman structure spectra correlations for polybromides
[AD-A091534] N81-14037

CHARGED PARTICLES
Performance characteristics of large aperture, ten-cell, atmospheric pressure isobutane Cerenkov counters
[DOE/ER-14529/1] N81-14509

CHEMICAL ANALYSIS
Electron microprobe mineral analysis guide
[NASA-CR-160895] N81-14018
An analytical chemical system for the determination of heavy metals and organic compounds
[DOE/EV-04320/1] N81-14045
An analytical chemical system for the determination of heavy metals and organic compounds
[DOE/EV-04320/3] N81-14046
Electrochemical methods of chemical analysis. Citations from the NTIS data base
[PB80-815053] N81-14057
Development and optimization of methodologies for analysis of complex hydrocarbon mixtures
[DOE/ER-10554-T1] N81-14114
Gasification of disordered carbons (chars)
[DOE/ER-10488-1] N81-14115
Analysis of explosive composite RX-14-AE (HMX/polythylene/oleic acid)
[UCID-18785] N81-14132
The identification of trends in outgassing technology N81-14160
Measurement techniques for high power semiconductor materials and devices
[PB80-217623] N81-14261
Computerized tomographic determination of spinal bone mineral content
[NASA-CR-160891] N81-14815

CHEMICAL BONDS
Perfluoroalkyl polytriazines containing pendent iododifluoromethyl groups
[NASA-CASE-ARC-11241-1] N81-14016

CHEMICAL CLEANING
Verification of selected solvent soluble coatings using production hybrid microcircuits
[AD-A091554] N81-14087

CHEMICAL COMPOSITION
Convection, composition and the thermal state of the lower mantle N81-14366

CHEMICAL ENERGY
Effects of several trace contaminants on fuel cell performance
[DOE/METC/RI-80/16] N81-14455

CHEMICAL FUELS
Acoustic fuel quantity measurement system. Signal conditioning unit
[AD-A091758] N81-13961

CHEMICAL PROPERTIES
Vapor-liquid critical properties
[NPL-CHEM-107] N81-14021

CHEMICAL REACTIONS
Chemical kinetic models for combustion of hydrocarbons and formation of nitric oxide
[NASA-TP-1794] N81-14017
Combined Electrolysis Catalytic Exchange (CECE)
[MLM-2774] N81-14051
Method for preparing addition type polyimide prepregs
[NASA-CASE-LAR-12054-2] N81-14078
Catalyst and process development for hygrogen preparation from future fuel cell feedstocks
[DOE/ET-15383-22] N81-14430

CHEMICAL REACTORS
Exploratory research on solvent refined coal liquefaction
[DOE/ET-14800/13] N81-14117
Crossed reaction networks in the catalytic hydrodenitrogenation of synthetic liquid fuels
[DOE/PC-30094/1] N81-14124
Catalytic combustion of coal-derived liquids
[NASA-TM-81594] N81-14396
Catalyst and process development for hygrogen preparation from future fuel cell feedstocks
[DOE/ET-15383-22] N81-14430
Development of a preprototype sabatier CO2 reduction subsystem
[NASA-CR-160885] N81-14624

CHEMILUMINESCENCE
Prototype chemiluminescent analyzer for measurement of hydrazines
[AD-A091678] N81-14032

CHEMISORPTION
Catalyst and process development for hydrogen preparation from future fuel cell feedstocks
[DOE/ET-15383/18] N81-14463
High-energy positron ionization of adsorbed species in the impulse approximation
[AD-A091748] N81-14805

CHEMOTHERAPY
Indometh acin-antihistamine combination for gastric ulceration control
[NASA-CASE-ARC-11118-2] N81-14613

CHIPS (MEMORY DEVICES)
A 32 kbit CCD-memory-device
[BMFT-FB-T-79-105] N81-14634

CHLOROPHYLLS
The relationship between differential areas and concentration in derivative absorption spectrophotometry
[DRIC-TRANS-6127] N81-14029
Development of empirical potential functions for the study of molecular geometry and applications to chlorophyll a dimers
[DOE/ER-02837-T1] N81-14810

CHROMATOGRAPHY
Improved polymers for enhanced oil recovery synthesis and rheology
[DOE/BETC-5603/10] N81-14089

CHROMIUM
Study to optimize Cr-Mo steels to resist hydrogen and temper embrittlement
[DOE/ET-13513/T1] N81-14068
Basic concepts for integrated RC networks and hybrid circuits on organic substrate foils
[BMFT-FB-T-79-87] N81-14231
Calcium/calcium chromate thermal battery and thermal battery assignment at the General Electric Neutron Devices Department
[GEPP-TIS-529] N81-14468
Imaging of surfaces and defects of crystals
[DOE/ER-02995/4] N81-14903

CHROMIUM ALLOYS
Imaging of surfaces and defects of crystals
[DOE/ER-02995/4] N81-14903

CIRCLES (GEOMETRY)
Stress intensity factors for cracks with circular and elliptic crack fronts, determined by 3D finite element methods --- corner, surface, and embedded cracks in cuboid blocks
[PNR-90035] N81-14349

CIRCUIT BOARDS
Bubble memory module
[NASA-CR-3380] N81-13993

CIRCUIT BREAKERS
Development of a HVDC prototype breaker
[DOE/ET-29054/1] N81-14251
Supplementary investigations to fundamental research program plasma techniques --- SF6 flow in a double nozzle circuit breaker model
[BMFT-FB-T-79-43] N81-14854

CIRCUIT DIAGRAMS
FETSIM user's manual and example --- D.C. and transient analysis of MOS circuits
[NASA-CR-150800] N81-14222
CIRCUIT PROTECTION
Base drive for paralleled inverter systems
[NASA-CASE-NPO-14163-1] N81-14220
CIRCUITS
Activities of the Radio Laboratory, 1977
[REPT-S-110] N81-14190
Convenience circuits --- amplitude compandored single sideband radios
[PB80-215783] N81-14213
Development of an electronic timepiece for technical applications
[BMFT-FB-T-79-88] N81-14232
Investigation of the interaction between the power electric circuit and power supply systems
[BMFT-FB-T-79-115] N81-14235
Method and apparatus for fabricating improved solar cell modules
[NASA-CASE-NPO-14416-1] N81-14389
Bipolar microprocessor circuits
[BMFT-FB-T-79] N81-14633
A 32 kbit CCD-memory-device
[BMFT-FB-T-79-105] N81-14634
CIRCULAR CYLINDERS
The effects of shear and roughness on vortex shedding patterns behind a circular cylinder at critical Reynolds numbers --- ocean thermal energy conversion cold water pipes
[DOE/NOAA/OTEC-1] N81-14284
CIRCULAR PLATES
A boundary element formulation for planar time-dependent inelastic deformation of plates with cutouts
[DOE/ER-02733/26] N81-14359
CIRCULATION
Numerical computations of swirling recirculating flow
[NASA-CR-165196] N81-14267
CIVIL AVIATION
Aircraft maintenance. Citations from the International Aerospace Abstracts data base
[PB80-815905] N81-13917
An assessment of General Aviation utilization of advanced avionics technology
[NASA-CR-159328] N81-13941
The future of civil turbo-fan engines
[PNR-90034] N81-13964
CLAYS
Systematic study of metal ion sorption on selected geologic media --- tracers for oil recovery systems
[DOE/BETC/OR-14] N81-14545
CLEANERS
Ultrasonic cleaner evaluation
[GEPP-TIS-526] N81-14800
CLEAR AIR TURBULENCE
Clear air turbulence: Historical comments
N81-14562
The 1979 clear air turbulence flight test program
N81-14569
Clear air turbulence forecasting techniques
N81-14573
CLIMATE
System techniques, satellites, orbit design, thermal control, power supply, attitude control, telemetry system
[DFVLR-FB-79-37] N81-13984
Global temperature patterns 6000 years ago
[DOE/EV-100097/1] N81-14591
CLIMATOLOGY
Site insolation and wind power characteristics
[DOE/CS-20160/01-VOL-1] N81-14546
CLOCKS
Development of an electronic timepiece for technical applications
[BMFT-FB-T-79-88] N81-14232
CLOSED CYCLES
Proceedings of the Depeartment of Energy Advanced Gas Turbine Central Power Systems Workshop
[CONF-8004103] N81-14479
CLOUD COVER
Estimates of incoming shortwave radiation and net radiation from standard meteorological data
[KNMI-WR-80-6] N81-14189
Proceedings of the workshop on Modification of the Upper Atmosphere by Satellite Power System (SPS) Propulsion Effluents
[CONF-7906180] N81-14548
Solar energy meteorological research and training site, region 5
[DOE/ET-20172] N81-14590
CLOUD HEIGHT INDICATORS
Ceiling and visibility instrumentation within government agencies N81-14565
CLOUDS
Lidar observations at 0.7-micrometers and 10.6 micrometers wavelengths during smoke week 2
[AD-A091561] N81-14382
CLOUDS (METEOROLOGY)
Studies in objective forecasting of mesoscale weather using an interactive computer system
[AD-A091752] N81-14580
CMOS
Development of an electronic timepiece for technical applications
[BMFT-FB-T-79-88] N81-14232
COAL
Opportunities for coal to methanol conversion
[DOE/CS-50009/01] N81-14113
Overview of the environmental concerns of coal transportation
[ANL/EES/TM-99] N81-14515
Trace metals and Stationary Conventional Combustion Processes. Volume 1: Technical report
[PB80-216161] N81-14519
COAL DERIVED LIQUIDS
Hot corrosion/erosion testing of materials for application to advanced power conversion systems using coal-derived fuels. Task 2: Fluidized bed combustion
[FE-2452-39] N81-14071
Catalytic combustion of coal-derived liquids
[NASA-TM-81594] N81-14396
COAL GASIFICATION
Opportunities for coal to methanol conversion
[DOE/CS-50009/01] N81-14113
Gasification of disordered carbons (chars)
[DOE/ER-10488-1] N81-14115
Coal Gasification Quarterly Report, April - June 1979
[DOE/FE-0002-79/2] N81-14126
The environmental assessment of synfuels projects
[DOE/TIC-11286] N81-14512
COAL LIQUEFACTION
Exploratory research on solvent refined coal liquefaction
[DOE/ET-14800/11] N81-14116
Exploratory research on solvent refined coal liquefaction
[DOE/ET-14800/13] N81-14117
Investigation of sulfur-tolerant catalysts for selective synthesis of hydrocarbon liquids from coal derived gases
[DOE/ET-14809/3] N81-14118
Enthalpy measurement of coal-derived liquids
[DOE/ET-13395/3-4] N81-14119
COAL UTILIZATION
Development of a simple fluidized-bed coal combustion model for the assessment of a pressurized fluidized-bed combustion system for electrical power generation
[DOE/METC/SP-80/15] N81-14044
Support studies in fluidized-bed combustion
[PB80-218613] N81-14056
Opportunities for coal to methanol conversion
[DOE/CS-50009/01] N81-14113
Gasification of disordered carbons (chars)
[DOE/ER-10488-1] N81-14115
Exploratory research on solvent refined coal liquefaction
[DOE/ET-14800/11] N81-14116
Investigation of sulfur-tolerant catalysts for selective synthesis of hydrocarbon liquids from coal derived gases
[DOE/ET-14809/3] N81-14118
Enthalpy measurement of coal-derived liquids
[DOE/ET-13395/3-4] N81-14119
Synthetic fuels and the environment: An environmental and regulatory impact analysis
[DOE/EV-0087] N81-14122
Coal Gasification Quarterly Report, April - June 1979
[DOE/FE-0002-79/2] N81-14126
Methane recovery from coalbeds. Project plan document, FY 1981
[DOE/TIC-11269] N81-14127
Effect of fuel nitrogen and hydrogen content on emissions in hydrocarbon combustion
[NASA-TM-81612] N81-14399
Conversion to coal and coal/oil firing
[ICTS/TR-07] N81-14405
Proceedings of the Depeartment of Energy Advanced Gas Turbine Central Power Systems Workshop
[CONF-8004103] N81-14479
The environmental assessment of synfuels projects
[DOE/TIC-11286] N81-14512
COASTAL CURRENTS
An explicit model for two-dimensional tidal circulation using triangular finite elements: WAVETL user's manual
[PB80-226046] N81-14604
COASTAL ECOLOGY
A multifrequency evaluation of active and passive microwave sensors for oil spill detection and assessment N81-14152
COASTAL WATER
Coastal zone wind energy. Part 1: Synoptic and mesoscale controls and distributions of coastal wind energy
[DOE/ET-20274/7-PT-1] N81-14434
Phytoplankton composition and abundance in Southern Lake Huron
[PB80-216013] N81-14610
COATING
Recent advances in Pt coating of microspheres by a batch magnetron sputtering process
[UCRL-84478] N81-14074
COATINGS
Verification of selected solvent soluble coatings using production hybrid microcircuits
[AD-A091554] N81-14087
Passivation of silicon power devices by thermal oxidation
[BMFT-FB-T-79-48] N81-14401
COAXIAL FLOW
Numerical computations of swirling recirculating flow
[NASA-CR-165196] N81-14267
COBALT
Electro-chemical polishing of cobalt in ethylene glycol and dimethyl formamide solutions of cobalt chloride
[PNR-90027] N81-14173
COBALT ALLOYS
Hot corrosivity of coal gasification products on gas turbine alloys
[DOE/ET-13547/T1] N81-14070
COBOL
Datapoint 6600 COBOL 3.3
[PB80-219868] N81-14675
Sperry univac exec-8 operating system
[PB80-219876] N81-14676
CODING
Analysis and development of image statistics and redundancy removal
[AD-A091600] N81-14381
COERCIVITY
Development of soft magnetic materials with special properties
[BMFT-FB-T-79-32] N81-13996
COGENERATION
Industrial cogeneration case studies
[EPRI-EM-1531] N81-14467
District heating/cogeneration application studies for Minneapolis-St. Paul area. Modifications of the existing units at the High Bridge Power Plant to cogeneration for hot water district heating
[ORNL/TM-6830/P9] N81-14474
COLLAPSE
Design criteria for deflection capacity of conventionally reinforced concrete slabs. Phase 3: Summary of design criteria and design and construction details; design examples
[AD-A091616] N81-14177
COLLISION AVOIDANCE
Midair and near midair collisions on two- and three-dimensional curviinear flight paths
[DFVLR-FB-80-13] N81-13944
A literature study on visual motion accuity (minimum perceptible movement)
[DFVLR-MITT-80-06] N81-14618

COLLISION PARAMETERS
Cross sections for charge transfer collisions involving hydrogen atoms --- fusion plasmas
[IPPJ-AM-15] N81-14847

COLLISIONAL PLASMAS
Some necessary parameters for a critical velocity interaction between the ionospheric plasma and a Xenon cloud
[TRITA-EPP-79-20] N81-14857

COLLISIONLESS PLASMAS
Critical ionization velocity effects in astrophysical plasmas
[TRITA-EPP-79-14] N81-14856

COMBINATORIAL ANALYSIS
A recursive approach to the implementation of enumerative methods
[MC-BW-116/80] N81-14728

COMBUSTIBLE FLOW
Measurements of fluctuating density and temperature in an axisymmetric flame
[AASU-342] N81-14028

COMBUSTION
Study of combustion and flame processes initiated by IR laser-induced absorption
[COO-4695-4] N81-14049
Combustion mechanisms of solid propellants
[AD-A091857] N81-14108
Ultra-lean combustion at high inlet temperatures
[NASA-TM-81640] N81-14398

COMBUSTION CHAMBERS
MHD coal-fired flow facility
[DOE/ET-10815/47] N81-14433

COMBUSTION EFFICIENCY
Development of a simple fluidized-bed coal combustion model for the assessment of a pressurized fluidized-bed combustion system for electrical power generation
[DOE/METC/SP-80/15] N81-14044
Efficient utilization of alternate fuels: Development of models for the prediction of interchangeability, design, and performance of gas burner/combustor systems
[PB80-218282] N81-14134
Catalytic combustion of coal-derived liquids
[NASA-TM-81594] N81-14396

COMBUSTION PHYSICS
A theory of droplet combustion at high pressures
[SAND-80-0081] N81-14040
Trace metals and Stationary Conventional Combustion Processes. Volume 2: Bibliography
[PB80-216179] N81-14520

COMBUSTION PRODUCTS
Reduction of exhaust smoke from gas-turbine engines by using fuel emulsions
[AD-A091777] N81-13953
Ultra-lean combustion at high inlet temperatures
[NASA-TM-81640] N81-14398
Effect of fuel nitrogen and hydrogen content on emissions in hydrocarbon combustion
[NASA-TM-81612] N81-14399
An evaluation of emission factors for waste-to-energy systems
[PB80-226665] N81-14521
Urban air pollution. Citations from the NTIS data base
[PB80-814411] N81-14526

COMMAND AND CONTROL
The collision course: Conditions, guidance laws and properties
[DFVLR-FB-80-06] N81-13942

COMMERCIAL ENERGY
Solar heating, cooling and domestic hot water system installed at Columbia Gas System Service Corporation, Columbus, Ohio
[NASA-CR-161603] N81-14394
Alternate central receiver power system program, phase 2. Volume 1: Commercial plant design refinement
[DOE/SF-10535/1-1] N81-14460

COMMINUTION
Production of high purity metal and metal-alloy powders free of oxygen for subsequent processing of high-qualified sintering and semi-finished parts
[BMFT-FB-T-79-173] N81-14058

COMMITTEE ON SPACE RESEARCH
Space research activity in Italy. Report to COSPAR N81-14959

COMMUNICATING
RSTS/E communications link via an asynchronous multiplexer
[ORNL/CSD/TM-128] N81-14670

COMMUNICATION NETWORKS
Telephone network behavior in repeated attempts environment: A simulation analysis
[FUB-15-1979] N81-14193
Communications support for flight data entry and printout terminals
[AD-A091580] N81-14202
Semiconductor crosspoints for direct replacement of electromechanical switches with high voltage requirements
[BMFT-FB-T-79-44] N81-14229

COMMUNICATION SATELLITES
Comprehensive testing of a defense systems communications satellite N81-14139
R. F. testing of the third generation defense communication satellite N81-14141

COMPILERS
The revised ALGOL 68 test set
[MC-IW-122/79] N81-14629
A survey of high level microprogramming languages
[MC-IW-138/80] N81-14657
Ada compiler validation implementers' guide
[AD-A091760] N81-14660
Datapoint 6600 COBOL 3.3
[PB80-219868] N81-14675
Sperry univac exec-8 operating system
[PB80-219876] N81-14676

COMPOSITE MATERIALS
A resin injection technique for the fabrication of aero engine composite components
[PNR-90024] N81-14004
Constant-amplitude and flight-by-flight tests on CERP specimens
[MBB-FE-2/S/PUB-26] N81-14006
Investigation of the minimum deployment time of a foam/fabric composite material
[AD-A091658] N81-14010
On one-dimensional acceleration waves in composite materials modeled as interpenetrating solid continua
[AD-A091615] N81-14011
Unidirectional composites as electrodes/preionization sources for CO2 tea lasers
[AD-A091407] N81-14012
Design criteria for deflection capacity of conventionally reinforced concrete slabs. Phase 1: State-of-the-art report
[AD-A091738] N81-14175
Design criteria for deflection capacity of conventionall reinforced concrete slabs. Phase 2: Design and construction requirements
[AD-A091517] N81-14176
Elastic moduli of boron carbide/copper composites from minus 40 deg C to 800 deg C by ultrasonic methods
[SAND-80-0881] N81-14356

COMPOSITION (PROPERTY)
Hotspots, basalts and the evolution of the mantle N81-14368

COMPRESSED AIR
Synthesis of research and development in mechanical energy storage technologies
[DOE/ET-16106/T1] N81-14439

COMPRESSIBILITY
Errors associated with imperfect surfaces in standard hot-plate thermal conductivity measurements
[NPL-QU-57] N81-14170

COMPRESSIBILITY EFFECTS
Development of an ASP (Air Stabilized Platform)
[PB80-221997] N81-14183

COMPRESSIVE STRENGTH
Design criteria for deflection capacity of conventionally reinforced concrete slabs. Phase 1: State-of-the-art report
[AD-A091738] N81-14175

COMPRESSORS
Effects of downstream distance on turbulence decay for the compressor research facility low conditioning system
[AD-A091543] N81-14276
Compressor configuration and design optimization for the high reliability gas turbine
[DOE/ET-15425/T1] N81-14327

COMPUTATION
A quick accurate method for calculating temperatures arising from rectangular and circular microcircuit heat sources
[AWRE-O-30/80] N81-14241
PROGTEST: A computer system for the analysis of computational computer programs
[AD-A091653] N81-14667
An analytical transformation technique for generating uniformly spaced computational mesh N81-14717
Generation of C-type cascade grids for viscous flow computation N81-14721
Computing the perimeter of a set of rectangles
[MC-IW-121/79] N81-14729
Automatic detection and treatment of oscillatory and/or stiff ordinary differential equations
[COO-2383-0068] N81-14759

COMPUTATIONAL FLUID DYNAMICS
Boundary-fitted coordinate systems for arbitrary computational regions N81-14713

COMPUTER DESIGN
A comparitive analysis of the Intel 8086, the Zilog Z8000 and the Motorola MC68000 microprocessors
[MC-IW-129/80] N81-14631
Bipolar microprocessor circuits
[BMFT-FB-T-79] N81-14633
Trends in computer technology. Citations from the NTIS data base
[PB80-815129] N81-14645

COMPUTER GRAPHICS
Automated emergency meteorological response system
[DP-MS-80-81] N81-14592
Biplot display multivariate matrices for inspection of data and diagnosis
[AD-A091821] N81-14659
Contour digitizing and tagging software (CONTAGRID)
[AD-A091736] N81-14661
S2KPLOT/DOEPLOT, implementation and programmers manual
[PB80-219926] N81-14671
S2KPLOT version 3.0, user's manual
[PB80-219934] N81-14674
Three dimensional digital technology
[AD-A091045] N81-14688
Computing the perimeter of a set of rectangles
[MC-IW-121/79] N81-14729

COMPUTER NETWORKS
Computer networks. Citations from the NTIS data base
[PB80-814007] N81-14260
Distributed data processing standards forecast
[PB80-216211] N81-14642
An overview of a minicomputer network
[SAND-80-0821] N81-14678
Computer networks. Citations from the NTIS data base
[PB80-814015] N81-14679

COMPUTER PROGRAMMING
An automatic method for checking the internal consistency of activity coefficients of binary mixtures
[NPL-CHEM-104] N81-14020
Bitonic sort on ultracomputers
[MC-IW-117/79] N81-14626
Design of fault-tolerant computers using ROM as basic building block
[AD-A091715] N81-14635
Equational specifications for computable data types: Six hidden functions suffice and other sufficiency bounds
[MC-IW-128/80] N81-14652
Evaluation of the language Ada for use in numerical computations
[NPL-DNACS-30/80] N81-14655
Problematic features of programming languages: A situational-calculus approach. Part 1: Assignment statements
[AD-A091639] N81-14665
The effects of symbology and spatial arrangement on the comprehension of software specifications
[AD-A091614] N81-14669
Conversion products/aids survey, August 1980
[PB80-222029] N81-14673

COMPUTER PROGRAMS
A computer program for the design and analysis of low-speed airfoils, supplement
[NASA-TM-81862] N81-13921

Development of a computer program data base of a navigation aid environment for simulated IFR flight and landing studies
[NASA-TM-80064] N81-13959
Metric accuracy analysis
[AD-A091749] N81-13982
Determination of the primary specular point in the sunglint pattern of a polar-orbiting satellite image
[AD-A091664] N81-13989
Experimental modeling of laminar composites for multifrequency eddy current measurements
[BDX-613-2462] N81-14014
Electrochemical machining in-process data collection and control
[Y-2209] N81-14180
Digital data reduction algorithm for oscillatory signals with an application to L-instability
[VTH-LR-298] N81-14194
Computer aided design of microcircuits. Citations from the NTIS data base
[PB80-814296] N81-14258
Computer aided design of microcircuits. Citations from the Engineering Index data base
[PB80-814304] N81-14259
Computer networks. Citations from the NTIS data base
[PB80-814007] N81-14260
Analytic solutions for thermal conduction from heat producing cylinders and spheres
[SAND-80-0039] N81-14277
SOLA-VOF: A solution algorithm for transient fluid flow with multiple free boundaries
[LA-8355] N81-14281
Asymptotic analysis of a co-focal unstablet resonator without active media --- laser, cavity resonator
[CISE-1526] N81-14301
Automation of a maintainability prediction
[AD-A091787] N81-14339
BICYCLE: A comptuer code for calculating levelized life-cycle costs
[LA-8493-MS] N81-14341
Finite element analysis of time-dependent inelastic deformation in the presence of transient thermal stresses
[COO-2733-25] N81-14364
SEEFAR: An improved model for producing line-of-sight maps
[AD-A091855] N81-14377
Air Force runoff model (AFRUM) user manual documentation
[AD-A091717] N81-14380
Solar central receiver in perspective
[SAND-79-2154C] N81-14414
Developing and upgrading of solar system thermal energy storage simulation models
[DOE/CS-34482/4] N81-14422
An automated procedure for composition of severe weather watch areal redefining statements
[PB80-225584] N81-14595
A computer program for determining and displaying the geostrophic winds on Lakes Superior and Michigan
[PB80-225675] N81-14599
An explicit model for two-dimensional tidal circulation using triangular finite elements: WAVETL user's manual
[PB80-226046] N81-14604
The USAFA/8086. A state of the art microprocessor system. volume 2: Software documentation
[AD-A091779] N81-14638
Application of microprocessors in measurement
[CONF-801116-1] N81-14641
Trends in computer technology. Citations from the NTIS data base
[PB80-815129] N81-14645
A computer program for the generation of logic networks from task chart data
[NASA-CR-3364] N81-14646
Modifications to the Hess three-dimensional lifting body code to convert from CDC FORTRAN to IBM FORTRAN with reductions in core requirements and execution times N81-14647
Floppy disk utility user's guide
[NASA-CR-160889] N81-14648
PROGTEST: A computer system for the analysis of computational computer programs
[AD-A091653] N81-14667
The effects of symbology and spatial arrangement on the comprehension of software specifications
[AD-A091614] N81-14669
Conversion products/aids survey, August 1980
[PB80-222029] N81-14673
S2KPLOT version 3.0, user's manual
[PB80-219934] N81-14674
Prediction of sound radiated from different practical jet engine inlets
[NASA-CR-163824] N81-14789
Snow: A digital computer program for the simulation of ion beam devices
[SAND-79-1027] N81-14823
Numerical solution of initial-value problems in plasma physics --- fusion research
[UCRL-85033] N81-14891
Heat transfer modeling for a non-fluidized particulate bed
[EGG/ENI-143] N81-14910

COMPUTER STORAGE DEVICES

How inefficient are stack-oriented abstract machines?
[MC-IW-123/79] N81-14630
A two-stage nonrecursive filter/decimator
[SAND-80-0891] N81-14639

COMPUTER SYSTEMS DESIGN

Recurrent ultracomputers are not log n-fast
[MC-IW-118/79] N81-14627
The USAFA/8086. A state of the art microprocessor system. Volume 1: System hardware
[AD-A091772] N81-14637
Computer networks. Citations from the NTIS data base
[PB80-814015] N81-14679

COMPUTER SYSTEMS PROGRAMS

The USAFA/8086. A state of the art microprocessor system. volume 2: Software documentation
[AD-A091779] N81-14638
Computer science and technology: Conversion
[PB80-215338] N81-14644

COMPUTER TECHNIQUES

Troposcatter antenna positioner
[AD-A091778] N81-14198
A computer-based laser Doppler velocimeter
[DFVLR-MITT-79-14] N81-14289
Research in algebraic manipulation
[AD-A091675] N81-14755
The solution of manpower planning problems by the forward simplex method
[AD-A091521] N81-14916

COMPUTERIZED DESIGN

Activities of the Radio Laboratory, 1977
[REPT-S-110] N81-14190
Research in computer simulation of integrated circuits
[AD-A091609] N81-14245
Design of a high power 240 GHz gyromonotron
[AD-A091511] N81-14250
Computer aided design of microcircuits. Citations from the NTIS data base
[PB80-814296] N81-14258
Computer aided design of microcircuits. Citations from the Engineering Index data base
[PB80-814304] N81-14259
Application of microprocessors in measurement
[CONF-801116-1] N81-14641

COMPUTERIZED SIMULATION

Computer simulations for the microscopic mechanism of hot gas erosion
[AD-A091859] N81-14060
The role of the real-time simulation facility, SIMFAC, in the design, development and performance verification of the Shuttle Remote Manipulator System (SRMS) with man-in-the-loop N81-14147
Research in computer simulation of integrated circuits
[AD-A091609] N81-14245
Performance degradation of a 7400 TTL NAND gate due to sinusoidal interference
[AD-A091745] N81-14249
Regenerative flywheel storage system, volume 2
[UCRL-15290-VOL-2] N81-14485
Regenerative flywheel energy storage system. Volume 3: Life cycle and cost-benefit analysis of a battery-flywheel electric car
[UCRL-15290-VOL-3] N81-14486
An examination of the performance of two-stage group screening for use in computer simulation
[AD-A091553] N81-14668
Snow: A digital computer program for the simulation of ion beam devices
[SAND-79-1027] N81-14823
Numerical simulation of density evolution in JIPP T-2 Tokamak
[IPPJ-483] N81-14841
A computer simulation on microinstabilities and anomalous resistivity near the magnetic neutral sheet
[IJJP-487] N81-14845
Kinetic processes at grain boundaries
[DOE/ER-05002/11] N81-14905
Survey of CIG data base generation from imagery
[AD-A091508] N81-14923

COMPUTERS

Computer networks. Citations from the NTIS data base
[PB80-814007] N81-14260
Bitonic sort on ultracomputers
[MC-IW-117/79] N81-14626
Trends in computer technology. Citations from the NTIS data base
[PB80-815129] N81-14645

CONCENTRATION (COMPOSITION)

Vapor-liquid critical properties
[NPL-CHEM-107] N81-14021
Electrochemical and surface analysis of the reactive interfaces in the li(si)feS2 primary battery
[SAND-79-2155C] N81-14901

CONCRETE STRUCTURES

Design criteria for deflection capacity of conventionally reinforced concrete slabs. Phase 3: Summary of design criteria and design and construction details; design examples
[AD-A091616] N81-14177

CONCRETES

Design criteria for deflection capacity of conventionally reinforced concrete slabs. Phase 1: State-of-the-art report
[AD-A091738] N81-14175
Design criteria for deflection capacity of conventionall reinforced concrete slabs. Phase 2: Design and construction requirements
[AD-A091517] N81-14176
Sealing joints and cracks, thin resurfacing, and locating voids under concrete slabs
[PB80-215635] N81-14182

CONDENSATES

Development of an airborne lidar for characterizing particle distribution in the atmosphere
[EPRI-EA-1538] N81-14514

CONDENSING

Phase-equilibria for design of coal gasification processes. Dew points of hot gases containing condensible tars
[DOE/ET-10603/T1] N81-14120

CONFERENCES

Aviation safety: Interior compartment materials
[GPO-50-388] N81-13933
The 11th Space Simulation Conference
[NASA-CP-2150] N81-14138
Stragetic laser communications program. Volume 1: Proceedings of the Navy/DARPA Fourth Technical Interchange Meeting
[AD-A091619] N81-14201
Community energy self-reliance
[SERI/CP-354-421] N81-14481
Proceedings: Fourth Annual Workshop on Meteorological and Environmental Inputs to Aviation systems
[NASA-CP-2139] N81-14555
Numerical grid generation techniques --- conference
[NASA-CP-2166] N81-14690
Space plasma physics active experiments
[NASA-CP-2165] N81-14944

CONFIDENCE LIMITS

Handbook of satellite pointing errors and their statistical treatment
[ESS/SS-997] N81-13985
Methods in probability and statistical inference
[COO-2751-4] N81-14775

CONFORMAL MAPPING

Numerical grid generation techniques --- conference
[NASA-CP-2166] N81-14690
Grid generation using classical techniques N81-14691
Conformal mapping of multiply connected regions onto regions with specified boundary shapes N81-14712
A body-fitted conformal mapping method with grid-spacing control N81-14727

CONGRESSIONAL REPORTS
Aviation safety: Interior compartment materials [GPO-50-388] N81-13933
Testimony of Elwood T. Driver, Vice Chairman, National Transportation Safety Board, accompanied by Gerrit J. Walhout, Chief, Human Factors Division, and Matthew M. McCormick, Senior Air Safety Investigator, Human Factors Division N81-13934
Testimony of James J. Kramer, Associate Administrator for Aeronautics and Space Technology, National Aeronautics and Space Administration, accompanied by John H. Enders, Project Manager, Aviation Safety Technology Office, John A. Parker, Chemical Research Projects Office, NASA-Ames Research Center, and Demitrius A. Kourtides, Chemical Research Projects Office, NASA-AMES Research Center N81-13935
Testimony of Richard W. Taylor, Vice President and Special Assistant to the President, and Eugene A. Bara, Chief Engineer, Payloads Systems, Boeing Commercial Airplane Company N81-13936
Testimony of a panel consisting of: Lloyd E. Frisbee, Vice President, Engineering and Operations, Lockheed California Company; Lyle A. Wright, Director, Powerplant Engineering, Douglas Aircraft Company, accompanied by Doctor H. C. Schjelderup, Chief Technology Engineer, Materials and Process Engineering, and F. E. Duskin, Senior Design Engineer, Interiors Engineering, Douglas Aircraft Company N81-13937
Foresight. Volume 3: The economic impact of energy conservation [GPO-41-483] N81-14390
Department of Housing and Urban Development, and certain independent agencies appropriations, fiscal year 1981, part 2 [GPO-62-143] N81-14926

CONSERVATION EQUATIONS
A random choice finite-difference scheme for hyperbolic conservation laws [DOE/ER-03077/167] N81-14908

CONSISTENCY
An automatic method for checking the internal consistency of activity coefficients of binary mixtures [NPL-CHEM-104] N81-14020

CONSTRAINTS
Fundamentals of conceptual design optimization of subsonic transport aircraft [VTH-LR-292] N81-13951
Economic evaluation of flying-qualities design criteria for a transport configured with relaxed static stability [NASA-TP-1760] N81-13968
Performed evaluation of unconstrained optimization techniques [DFVLR-MITT-79-21] N81-14680

CONSTRUCTION
Energy analysis of solar energy systems, heat pumps and of improved insulation of single family houses [BMFT-FB-T-79-101] N81-14403

CONSTRUCTION MATERIALS
Water-deuterium oxide exchange in polymers used in spacecraft applications --- outgassing from Mylar and Kapton N81-14159

CONTAMINANTS
A survey of simulation and test results for assessing RPV performance in a WBIC environment [AD-A091603] N81-13954
A survey of acid precipitation in northern California [PB80-225311] N81-14523

CONTEXT FREE LANGUAGES
Time and space complexity of inside-out macro languages [MC-IW-141/80] N81-14658

CONTRACT MANAGEMENT
Cost and schedule control systems criteria for contract performance measurement: Implementation guide [DOE/CR-0015] N81-14917

CONTRACTS
Standard spacecraft procurement analysis: A case study in NASA-DoD coordination in space programs [R-2619-RC] N81-14915

CONTROL MOMENT GYROSCOPES
Steering law for parallel mounted double-gimbaled control moment gyros. Revision A [NASA-TM-82390] N81-13991

CONTROL STABILITY
On the geometry of multivariable root-loci [RR-118] N81-14748

CONTROL SURFACES
Analysis of unsteady pressure measurements on an aerofoil section with an harmonically oscillating, slotted flap [DFVLR-FB-80-22] N81-13929
System identification of the longitudinal motion of the DFVLR HFB 320 research aircraft with particular consideration of control surface effectiveness [DFVLR-MITT-79-16] N81-13971
Active flutter suppression on an F-4F aircraft with external stores using already existing control surfaces [MBB-FE-17/S/PUB/24] N81-13972

CONTROL THEORY
Steering law for parallel mounted double-gimbaled control moment gyros. Revision A [NASA-TM-82390] N81-13991
A review of control theory for digital systems [RR-120] N81-14685
Control of dynamical systems [AD-A091704] N81-14686
A class of sequential input adaptive systems [AD-A091655] N81-14687
Control theory. Citations from the NTIS data base [PB80-814395] N81-14689
On the geometry of multivariable root-loci [RR-118] N81-14748

CONTROLLED FUSION
Properties of lead-lithium solutions [UCRL-84273] N81-14052

CONVECTION
The quiet-time pattern of auroral arcs as a consequence of magnetospheric convection [DMI-GEOPHYS-PAPERS-R-56] N81-14536

CONVECTION CURRENTS
One-dimensional simulation of temperature and moisture in atmospheric and soil boundary layers [NASA-CR-163841] N81-14531

CONVECTIVE HEAT TRANSFER
Studies of convective heat transfer coefficient enhancement in two-phase, non-boiling flow N81-14263

CONVERGENCE
A note on C(O) Galerkin methods for two point boundary problems [MC-NW-73/79] N81-14730
Superconvergence in collocation and implicit Runge-Katta methods for Volterra-type integral equations of the second kind [MC-NW-80/80] N81-14743
The numerical computation of the confluent hypergeometric function U(a, b, z) [MC-TW-202/80] N81-14747

CONVOLUTION INTEGRALS
Antifact removal in frequency domain compressed imagery [AD-A091533] N81-14663
Volterra integral equations and semigroups of operators [MC-TW-197/80] N81-14740

COOLING SYSTEMS
Ice-maker heat pump development [ORNL/CON-50] N81-14282
Advanced concepts test facility: Measurements and suggested test plan [EPRI-CS-1530] N81-14466

COORDINATE TRANSFORMATIONS
Numerical grid generation techniques --- conference [NASA-CP-2166] N81-14690
Grid generation using classical techniques N81-14691
Mesh generation using algebraic techniques N81-14693
Generation of boundary and boundary-layer fitting grids N81-14694
An electrostatic analog for generating cascade grids N81-14695
Grid and metric generation on the assembly of locally bi-quadratic coordinate transformations N81-14698
Grid generation for time dependent problems: Criteria and methods N81-14699
Generations of orthogonal surface coordinates N81-14700
A new coordinate transformation for turbulent boundary layer flows N81-14702
A body-fitted conformal mapping method with grid-spacing control N81-14727

COORDINATES
SEEFAR: An improved model for producing line-of-sight maps [AD-A091855] N81-14377
Contour digitizing and tagging software (CONTAGRID) [AD-A091736] N81-14661
Generation of orthogonal boundary-fitted coordinate systems N81-14703
Three dimensional spline-generated coordinate transformations for grids around wing-body configurations N81-14707
A simple numerical orthogonal coordinate generator for fluid dynamic applications N81-14710
A three-dimensional body-fitted coordinate system for flow field calculations on asymmetric nosetips N81-14711
Boundary-fitted coordinate systems for arbitrary computational regions N81-14713
Grid generation for general three-dimensional configurations N81-14714
Application of the multigrid method to grid generation N81-14718
Grid evolution in time asymptotic problems N81-14719
A two dimensional mesh verification algorithm N81-14720
Generation of C-type cascade grids for viscous flow computation N81-14721
Numerical generation of two-dimensional grids by the use of Poisson equations with grid control at boundaries N81-14722
Grid generation for two-dimensional finite element flowfield computation N81-14725
Multiple grid methods for the solution of Fredholm integral equations of the second kind [MC-NW-75/79] N81-14732

COPOLYMERS
Improved polymers for enhanced oil recovery synthesis and rheology [DOE/BETC-5603/10] N81-14089

COPPER
Large-scale integrated MOS circuits with small dimensions. Preparation of thin films [BMFT-FB-T-79-55] N81-14226
Elastic moduli of boron carbide/copper composites from minus 40 deg C to 800 deg C by ultrasonic methods [SAND-80-0881] N81-14356

CORE STORAGE
How inefficient are stack-oriented abstract machines? [MC-IW-123/79] N81-14630
Modifications to the Hess three-dimensional lifting body code to convert from CDC FORTRAN to IBM FORTRAN with reductions in core requirements and execution times N81-14647

CORRELATION
Misspecification of trend in spatial random function interpolation with application to oxidant mapping [DOE/EV-02874/59] N81-14517
Analysis of estimation errors in the identification of nonlinear systems [RR-115] N81-14776

CORROSION
Hot corrosion/erosion testing of materials for application to advanced power conversion systems using coal-derived fuels. Task 2: Fluidized bed combustion [FE-2452-39] N81-14071
High-temperature erosion-corrosion of alloys [EPRI-CS-1454] N81-14073

CORROSION PREVENTION
Ceramic turbine components research and development. Part 2: Evaluation of MCrAlY/ZrO2 (Y2O3) thermal-barrier coatings exposed to simulated gas turbine environments [EPRI-AP-1539-PT-2] N81-14331

CORROSION RESISTANCE
Development of high-temperature turbine subsystem technology to a technology readiness status, phase 2 [FE-1806-72] N81-14332

CORROSION TESTS
Air oxidation and seawater corrosion Hastelloy S and Hastelloy C-4 --- storage capsules for radioisotope heat source fuel [PNL-3344] N81-14072

COSMIC PLASMA
Studies of electrostatic double layers with applications to cosmic plasmas
[TRITA-EPP-80-03] N81-14861
Fragmentation in rotating isothermal protostellar clouds
[NASA-TM-82229] N81-14938
COST ANALYSIS
Microwave landing systems. Citations from the Engineering Index data base
[PB80-814643] N81-13947
Microwave landing systems. Citations from the NTIS data base
[PB80-814635] N81-13948
Technological forecasting--aircraft design. Citations from the International Aerospace data base
[PB80-815970] N81-13957
Hydroforming process for pressings
[PNR-90026] N81-14172
Communications support for flight data entry and printout terminals
[AD-A091580] N81-14202
Evaluation of advanced hydraulic turbomachinery for underground pumped hydroelectric storage. Part 1: Single-stage regulated pump turbines for operating heads of 500 to 1000 m
[ANL/ES-100-PT-1] N81-14328
Study of seed reprocessing systems for open cycle coal fired MHD power plants. Task 1: Selection of processes for more detailed study
[DOE/ET-15613/T1] N81-14435
An energy and cost analysis of residential heat pumps in northern climates
[DOE/TIC-11275] N81-14462
Strategic cost-benefit analysis of energy policies: Comparative analysis
[BNL-51128] N81-14469
Geothermal energy. Citations from the Engineering Index data base
[PB80-814684] N81-14496
Cost and schedule control systems criteria for contract performance measurement: Implementation guide
[DOE/CR-0015] N81-14917
COST EFFECTIVENESS
Solar mirror materials: Their properties and uses in solar concentrating collectors
[SAND-79-2190] N81-14412
Low cost bare-plate solar air collector
[DOE/R5-10143/T1] N81-14465
Alternative energy sources session ocean thermal energy conversion: Technology development
[PB80-218159] N81-14500
COST ESTIMATES
Residential heating costs: A comparison of geothermal solar and conventional resources
[PNL-3200] N81-14464
Satellite Power System: Utility impact study
[EPRI-AP-1548] N81-14470
COULOMETERS
Electrochemical methods of chemical analysis. Citations from the NTIS data base
[PB80-815053] N81-14057
COUPLING
Adaptive Antenna Control (AAC) program
[AD-A091764] N81-14197
Applications of multiconductor transmission line theory to the prediction of cable coupling: Volume 8. Prediction of cross talk involving braided shield cables
[AD-A091751] N81-14200
COUPLING COEFFICIENTS
Magnetoacoustic mode coupling to excitation structures
[TRITA-PFU-80-07] N81-14866
COUPLINGS
Device for coupling a first vehicle to a second vehicle
[NASA-CASE-GSC-12429-1] N81-14320
Micro-fluid exchange coupling apparatus
[NASA-CASE-ARC-11114-1] N81-14605
COVALENT BONDS
The molybdenum-molybdenum triple bond. 9: Bis(1, 3-di-p-tolyltriazenido) olybdenum
[AD-A091550] N81-13997
CRACK PROPAGATION
Mechanical characterization of Si3N4 N81-14005
Influence of environment on constant load and fatigue crack propagation of titanium alloys Ti-6Al-4V and Ti-8Al-1Mo-1V
[DFVLR-FB-80-08] N81-14059
Influences of gaseous environment on low growth-rate fatigue crack propagation in steels
[DOE/ER-10389/1] N81-14066
The study and modeling of high temperature fatigue crack propagation in austenitic stainless steel
[DOE/ER-10475/T1] N81-14067
Stress intensity factors for cracks with circular and elliptic crack fronts, determined by 3D finite element methods --- corner, surface, and embedded cracks in cuboid blocks
[PNR-90035] N81-14349
Fatigue threshold level in steel
[TRITA-HFL-0024] N81-14350
Static and dynamic response of an aluminum alloy panel having a central opening with combined in-plane biaxial static loading and acoustic excitation
[ISVR-TR-103] N81-14353
J-integral elastic plastic fracture mechanics evaluation of the stability of cracks in nuclear reactor pressure vessels
[SAND-80-0688] N81-14357
CRACKING (CHEMICAL ENGINEERING)
Ammonia as a hydrogen energy-storage medium
[BNL-28293] N81-14477
CRACKING (FRACTURING)
Joining of ceramics for high performance energy systems
[DOE/ET-15359/1] N81-14092
Ceramic turbine components research and development. Part 2: Evaluation of MCrAlY/ZrO2 (Y2O3) thermal-barrier coatings exposed to simulated gas turbine environments
[EPRI-AP-1539-PT-2] N81-14331
CRACKS
Numerical solution of an advection-diffusion equation for a dissolved species in a pulsating crack
[NPL-DNACS-28/80] N81-14025
Sealing joints and cracks, thin resurfacing, and locating voids under concrete slabs
[PB80-215635] N81-14182
Elastodynamic analysis of an edge-crack normal to the free surface of a half-space N81-14342
Graphs of the three-dimensional state of stress at the vertex of a quarter-infinite crack in a half-space
[NTHD-123] N81-14351
Numerical analysis of planar, time-dependent inelastic deformation of plates with cracks by the boundary element method
[DOE/ER-02733/27] N81-14360
Boundary element analysis of time-dependent inelastic deformation of cracked plates loaded in anti-plane shear
[DOE/ER-02733/28] N81-14361
CREEP PROPERTIES
Mechanisms of damage accumulation in time-dependent cyclic deformation
[DOE/ER-10570/1] N81-14363
CRITERIA
Landing flying qualities evaluation criteria for augmented aircraft
[NASA-CR-163097] N81-13969
CRITICAL FLOW
Primary calibrations of critical flow venturi nozzles in high-pressure gas
[NEL-666] N81-14270
Tables of homogeneous equilibrium critical flow parameters for water in SI units
[EGG-2056] N81-14280
CRITICAL PATH METHOD
A computer program for the generation of logic networks from task chart data
[NASA-CR-3364] N81-14646
CRITICAL PRESSURE
A theory of droplet combustion at high pressures
[SAND-80-0081] N81-14040
CRITICAL TEMPERATURE
Characterizing and improving the toughness of thick-sectioned 21/4Cr-1Mo electroslag weldments
[DOE/ET-12313/T1] N81-14344
CRITICAL VELOCITY
Critical ionization velocity effects in astrophysical plasmas
[TRITA-EPP-79-14] N81-14856
Some necessary parameters for a critical velocity interaction between the ionospheric plasma and a Xenon cloud
[TRITA-EPP-79-20] N81-14857
Enhanced interaction of the solar wind and the interstellar neutral gas by virtue of a critical velocity effect
[TRITA-EPP-79-19] N81-14942
CROSS CORRELATION
Analysis of estimation errors in the identification of nonlinear systems
[RR-115] N81-14776
CROSS FLOW
Convective ignition of propellant cylinders in a developing cross-flow field
[AD-A091852] N81-14107
The prediction of the flow and heat transfer in the vicinity of a jet in crossflow
[PNR-90025] N81-14271
CROSSED FIELDS
Equilibrium field coils for the Engineering Test Facility: Shaping the plasma cross section
[ORNL/TM-7339] N81-14886
CROSSLINKING
Crosslinking of aromatic polyamides via pendant propargyl groups
[NASA-TM-81918] N81-14080
Radiation-induced crosslinking and grafting reactions in polyethylene
[DOE/ER-02845/T1] N81-14090
CROSSTALK
Applications of multiconductor transmission line theory to the prediction of cable coupling: Volume 8. Prediction of cross talk involving braided shield cables
[AD-A091751] N81-14200
CRUDE OIL
Conversion to coal and coal/oil firing
[ICTS/TR-07] N81-14405
CRYOGENIC COOLING
Low cost cryostat
[NASA-CASE-NPO-14513-1] N81-14287
CRYOGENIC FLUIDS
TPC magnet cryogenic system
[LBL-10552] N81-14179
CRYOGENIC MAGNETS
TPC magnet cryogenic system
[LBL-10552] N81-14179
CRYOGENICS
Cryogenic aging of metals. Citations from the NTIS data base
[PB80-808868] N81-14075
CRYOPUMPING
Use of cryopumps on large space simulation systems N81-14145
CRYOSTATS
Low cost cryostat
[NASA-CASE-NPO-14513-1] N81-14287
CRYSTAL DISLOCATIONS
Mechanisms of damage accumulation in time-dependent cyclic deformation
[DOE/ER-10570/1] N81-14363
Characterization of extrinsic grain boundary dislocations and grain boundary dislocation sources by transmission electron microscopy
[DOE/AL-10887] N81-14902
CRYSTAL GROWTH
High power laser and materials investigation --- laser fusion
[DOE/DP-40054/1] N81-14307
CRYSTAL LATTICES
Analysis of spectral diffusion of localized triplet spin transitions within an inhomogeneous profile
[AD-A091714] N81-14033
Strategies for control of lattice architecture in low-dimensional molecular metals: Assembly of partially oxidized face-to-face linked arrays of metallomacrocycles
[AD-A091535] N81-14900
CRYSTAL OPTICS
Imaging of surfaces and defects of crystals
[DOE/ER-02995/4] N81-14903
CRYSTAL STRUCTURE
Development of soft magnetic materials with special properties
[BMFT-FB-T-79-32] N81-13996
Changes in surface chemistry of silicon carbide (0001) surface with temperature and their effect on friction
[NASA-TP-1756] N81-14079

CRYSTALLINITY
Mechanical properties of crystalline solids
[DOE/ER-02172/35] N81-14358
CURRENT DENSITY
Electrostatic double layers and a plasma evacuation process
[TRITA-EPP-79-21] N81-14858
CURRENT DISTRIBUTION
Calculation of traveling-wave wire antenna arrays with mutual impedances
[REPT-S-111] N81-14191
MHD coal-fired flow facility
[DOE/ET-10815/47] N81-14433
Disruptive shift of magnetic axis noncircular Tokamaks
[PPPL-1707] N81-14889
CUSHIONS
Temperature sensitive dynamic cushioning function development and validation for aircap cellular polyethylene
[AD-A091604] N81-14086
CUTTING
Laser cutting and machining: Nonmetals. Citations from the Engineering Index data base
[PB80-814437] N81-14309
CYBERNETICS
Control theory. Citations from the NTIS data base
[PB80-814395] N81-14689
CYCLIC LOADS
The stress behavior of three advanced nickel base superalloys during high temperature low cycle fatigue
[AD-A091694] N81-14061
Mechanisms of damage accumulation in time-dependent cyclic deformation
[DOE/ER-10570/1] N81-14363
CYCLONES
The Eastern Pacific Tropical Cyclone Strike Probability Program (EPSTRKP)
[AD-A091841] N81-14579
Annual data and verification tabulation Atlantic tropical cyclones 1979
[PB80-226301] N81-14598
CYCLOTRON FREQUENCY
Wave propagation in a deuterium-hydrogen-oxygen plasma in the range of ion cyclotron frequencies
[IPF-80-5] N81-14853
CYCLOTRON RESONANCE DEVICES
Analysis of oscillations in the gyrotron traveling wave amplifier
[AD-A091586] N81-14246
Design of a high power 240 GHz gyromonotron
[AD-A091511] N81-14250
CYLINDRICAL BODIES
Analytic solutions for thermal conduction from heat producing cylinders and spheres
[SAND-80-0039] N81-14277
CYLINDRICAL PLASMAS
Non-axisymmetric (m=plus or minus 1) Alfven waves in a cylindrical plasma
[IPF-80-1] N81-14851
Magnetoacoustic mode coupling to excitation structures
[TRITA-PFU-80-07] N81-14866

D

D REGION
Negative ion chemistry in the terrestrial D-region and signal flow graph theory
[AERONOMICA-ACTA-A-217-1980] N81-14528
DAMAGE
Mechanisms of damage accumulation in time-dependent cyclic deformation
[DOE/ER-10570/1] N81-14363
DATA ACQUISITION
Coordinated ionospheric and magnetospheric observations from the ISIS 2 satellite by the ISIS 2 experimenters. Volume 3: High-latitude charged particle, magnetic field, and ionospheric plasma observations during northern summer
[NASA-TM-82223] N81-14532
Solar energy meteorological research and training site, region 5
[DOE/ET-20172] N81-14590
Meteorological measurement system for support of atmospheric propagation studies
[UCRL-84547] N81-14594
DATA BASES
DOE/DOD environmental data bank index --- numerical definitions of environments to which equipment is disposed
[SAND-79-2130] N81-14506
Computer science and technology: Conversion
[PB80-215338] N81-14644
Evaluation of photon production data from neutron-induced reactions
[CONF-800979-1] N81-14819
Requirements for an historical stratification file using STD and CTD data
[AD-A091864] N81-14921
Specifications for an STD/CTD system at the NODC
[AD-A091866] N81-14922
Survey of CIG data base generation from imagery
[AD-A091508] N81-14923
Design and development of a seismic data center
[AD-A091621] N81-14924
DATA COMPRESSION
Antifact removal in frequency domain compressed imagery
[AD-A091533] N81-14663
DATA CONVERSION ROUTINES
Modifications to the Hess three-dimensional lifting body code to convert from CDC FORTRAN to IBM FORTRAN with reductions in core requirements and execution times N81-14647
Conversion products/aids survey, August 1980
[PB80-222029] N81-14673
DATA CORRELATION
Some error probabilities for the association of passive DF measurements with radar returns
[AD-A091659] N81-14206
DATA LINKS
Adaptive Antenna Control (AAC) program
[AD-A091764] N81-14197
DATA MANAGEMENT
Prospectus for data dictionary system standard
[PB80-225204] N81-14643
Computer science and technology: Conversion
[PB80-215338] N81-14644
Design and development of a seismic data center
[AD-A091621] N81-14924
DATA PROCESSING
An analytical chemical system for the determination of heavy metals and organic compounds
[DOE/EV-04320/1] N81-14045
Electrochemical machining in-process data collection and control
[Y-2209] N81-14180
Improved noise suppression for multiband imagery
[AD-A091815] N81-14196
Communications support for flight data entry and printout terminals
[AD-A091580] N81-14202
Statistical relationship between median visibility and conditions of worstcase manmade impact on visibility
[LA-UR-80-2485] N81-14550
Studies in objective forecasting of mesoscale weather using an interactive computer system
[AD-A091752] N81-14580
Role of the sectionalized Fourier Transform in high-speed coherence processing
[AD-A091419] N81-14636
Distributed data processing standards forecast
[PB80-216211] N81-14642
A characterization of computable data types by means of a finite, equational specification method
[MC-IW-124/79] N81-14649
An overview of the summer programming language
[MC-IW-126/79] N81-14651
Equational specifications for computable data types: Six hidden functions suffice and other sufficiency bounds
[MC-IW-128/80] N81-14652
Computing in algebraic systems
[MC-IW-130/80] N81-14653
Biplot display multivariate matrices for inspection of data and diagnosis
[AD-A091821] N81-14659
Extracting unidimensional chains from multidimensional datasets: A graph theory approach
[AD-A091693] N81-14765
Modeling seasonal ARMA processes
[AD-A091515] N81-14785
DATA RECORDING
Equipment for testing and measuring a 'helmet mounted sight and display' system with a coupled movable television camera in the flight-simulator for research of the DFVLR
[DFVLR-MITT-80-04] N81-13960
Digital Data Recording System (DDRS) operating and maintenance manual
[NASA-CR-160894] N81-14288
DATA REDUCTION
Digital data reduction algorithm for oscillatory signals with an application to L-instability
[VTH-LR-298] N81-14194
A computer-based laser Doppler velocimeter
[DFVLR-MITT-79-14] N81-14289
A characterization of computable data types by means of a finite, equational specification method
[MC-IW-124/79] N81-14649
Refinements to the Boolean approach to automatic data editing
[ORNL/TM-7156] N81-14925
DATA STORAGE
Bubble memory module
[NASA-CR-3380] N81-13993
Improvements in the digitizing of analogue information
[TDB-343] N81-14919
DATA SYSTEMS
A versatile microcomputer-based temperature controller
[SAND-79-2313] N81-14640
Prospectus for data dictionary system standard
[PB80-225204] N81-14643
A proposed neutron spectrometer system for JET
[TRITA-80-02] N81-14862
The flat-file alerter system
[AD-A091842] N81-14920
DATA TRANSMISSION
System for a displaying at a remote station data generated at a central station and for powering the remote station from the central station
[NASA-CASE-GSC-12411-1] N81-14221
Integrated circuits for remote command and data transmission
[BMFT-FB-T-79-50] N81-14230
Performance of the Gradient Adaptive Equalizer with Inherent Optimal Adjusting Step in Presence of Noise and Arithmetic Errors
[FUB-35-1979] N81-14240
DECARBURIZATION
Low alloy steels that minmize the hydrogen-carbide reaction, part 1
[DOE/ER-70296/T1] N81-14069
DECAY
Profit maximization models for exponential decay processes
[AD-A091522] N81-14768
A note on Zeno's paradox in quantom theory
[DOE/ER-03992/387] N81-14909
DECISION MAKING
Conceptual framework for describing selected urban and community impacts of federal energy policies
[PNL-3492] N81-14929
Network flow optimization for water resources planning with uncertainties in supply and demand
[PB80-221161] N81-14934
DECOMPOSITION
Infrared emission spectroscopy of low pressure gaseous discharges, 3
[AD-A091744] N81-14540
DEFECTS
Spectrum fatigue testing of simple test specimens containing artificial defects --- aluminum alloy 7075-T6 clad sheets with open holes
[FAA-TN-HU-2108] N81-14354
DEFENSE COMMUNICATIONS SYSTEM (DCS)
The 11th Space Simulation Conference
[NASA-CP-2150] N81-14138
Comprehensive testing of a defense systems communications satellite N81-14139
R. F. testing of the third generation defense communication satellite N81-14141
DEFLECTION
Design criteria for deflection capacity of conventionally reinforced concrete slabs. Phase 1: State-of-the-art report
[AD-A091738] N81-14175

Design criteria for deflection capacity of conventionall reinforced concrete slabs. Phase 2: Design and construction requirements
[AD-A091517] N81-14176
Design criteria for deflection capacity of conventionally reinforced concrete slabs. Phase 3: Summary of design criteria and design and construction details; design examples
[AD-A091616] N81-14177

DEFORMATION
On one-dimensional acceleration waves in composite materials modeled as interpenetrating solid continua
[AD-A091615] N81-14011
Finite element analysis of time-dependent inelastic deformation in the presence of transient thermal stresses
[COO-2733-25] N81-14364
Characterization of extrinsic grain boundary dislocations and grain boundary dislocation sources by transmission electron microscopy
[DOE/AL-10887] N81-14902

DEGRADATION
Ceramic turbine components research and development. Part 2: Evaluation of MCrAlY/ZrO2 (Y2O3) thermal-barrier coatings exposed to simulated gas turbine environments
[EPRI-AP-1539-PT-2] N81-14331

DELAY LINES
Evaluation of a CCD for analog delay
[AD-A091622] N81-14247

DELTA WINGS
Experimental study of supersonic viscous leeside flow over a slender delta wing
[NASA-TM-81248] N81-14265

DENITROGENATION
Crossed reaction networks in the catalytic hydrodenitrogenation of synthetic liquid fuels
[DOE/PC-30094/1] N81-14124

DENSITY (MASS/VOLUME)
Bibliography of fluid density: Experimental determinations on single substances over a temperature range exceeding 40 K
[NPL-CHEM-106] N81-14264

DENSITY MEASUREMENT
Some results on measurement of temperature and density in a flame by Raman spectroscopy N81-14019
Measurements of fluctuating density and temperature in an axisymmetric flame
[AASU-342] N81-14028
Bibliography of fluid density: Experimental determinations on single substances over a temperature range exceeding 40 K
[NPL-CHEM-106] N81-14264

DEPLETION
Ionospheric effects of rocket exhaust products (HEAO-C, Skylab and SPS-HLLV)
[DOE/ER-0082] N81-14544

DEPOSITION
Electrochromic displays
[BMFT-FB-T-79-108] N81-14234
A survey of acid precipitation in northern California
[PB80-225311] N81-14523

DEPTH MEASUREMENT
Computerized bathymetry and shorelines of the Great Lakes
[PB80-218308] N81-14387

DESALINIZATION
A 25 kW solar photovoltaic flat panel power supply for an electrodialysis water desalination unit in New Mexico
[DOE/ET-23061/1] N81-14444

DESIGN ANALYSIS
Fundamentals of conceptual design optimization of subsonic transport aircraft
[VTH-LR-292] N81-13951
Economic evaluation of flying-qualities design criteria for a transport configured with relaxed static stability
[NASA-TP-1760] N81-13968
Design considerations for a thermal decomposition analytical system
[PB80-219116] N81-14054
Efficient utilization of alternate fuels: Development of models for the prediction of interchangeability, design, and performance of gas burner/combustor systems
[PB80-218282] N81-14134
Development of an ASP (Air Stabilized Platform)
[PB80-221997] N81-14183
Development of a HVDC prototype breaker
[DOE/ET-29054/1] N81-14251
Ceramic heat pipe development
[DOE/TIC-11293] N81-14279
Evaluation of advanced hydraulic turbomachinery for underground pumped hydroelectric storage. Part 1: Single-stage regulated pump turbines for operating heads of 500 to 1000 m
[ANL/ES-100-PT-1] N81-14328
Predesign energy analysis: A new graphic approach to energy conscious design for buildings
[DOE/CS-0171] N81-14449
Alternate central receiver power system program, phase 2. Volume 1: Commercial plant design refinement
[DOE/SF-10535/1-1] N81-14460
Technical and management support for the development of small wind systems
[RFP-3126/3533/80/2] N81-14475
Fusion reactor physics and technology
[DOE/ET-52048/T1] N81-14881

DETECTION
Direct detection of hydrocarbons using seismic procedures
[BMFT-FB-T-79-31] N81-14534
Observing lightning from ground-based and airborne stations N81-14566
The 1979 clear air turbulence flight test program N81-14569

DETERMINANTS
Inequalities connecting eigenvalues and nonprincipal subdeterminants
[AD-A091503] N81-14786

DEUTERIDES
Isotope effect on hydrogen site energies for two metal dihydrides
[SAND-79-1541C] N81-14039

DEUTERIUM PLASMA
Wave propagation in a deuterium-hydrogen-oxygen plasma in the range of ion cyclotron frequencies
[IPF-80-5] N81-14853

DEUTERONS
Thermodynamic interpretation of multiparticle emission in relativistic heavy ion collisions
[DOE/ER-03992/388] N81-14812

DEVELOPING NATIONS
Market definition study of photovoltaic power for remote villages in developing countries
[NASA-CR-159880] N81-14391

DF LASERS
Hydrogen fluoride and deuterium fluoride lasers. Citations from the International Aerospace Abstracts data base
[PB80-815871] N81-14313

DIAMINES
Method for preparing addition type polyimide prepregs
[NASA-CASE-LAR-12054-2] N81-14078

DIATOMIC MOLECULES
Surface magnetic field/laser synergistic effects on the predissociation of adsorbed diatomic molecules
[AD-A091747] N81-14306

DICTIONARIES
Prospectus for data dictionary system standard
[PB80-225204] N81-14643

DIELECTRICS
Magneto-optic materials for biasing ring laser gyros. Computer model evaluating scattering from multilayer dielectric thin film structures containing a magnetic layer
[AD-A091540] N81-14293

DIESEL FUELS
Ultra-lean combustion at high inlet temperatures
[NASA-TM-81640] N81-14398

DIFFERENCE EQUATIONS
An adaptive computation mesh for the solution of singular perturbation problems N81-14701
Identification of nonlinear systems using parameter estimation techniques
[RR-117] N81-14779

DIFFERENTIAL EQUATIONS
Generation of boundary and boundary-layer fitting grids N81-14694
Boundary-fitted coordinates for regions with highly curved boundaries and reentrant boundaries N81-14709
Linear multistep methods and the construction of quadrature formulae for Volterra integral and integro-differential equations
[MC-NW-76/79] N81-14733
Modified Nystroem methods for semi-discrete hyperbolic differential equations
[MC-NW-78/80] N81-14735
A guide to the theory of gear's method for the numerical solution of systems of stiff ordinary differential equations
[NPL-DNACS-29/80] N81-14741
A note on a differential system constructed by H. O. Kreiss
[TRITA-NA-8004] N81-14742
A general method of approximation particulary in L2
[FOA-C-10158-M8] N81-14750
Automatic detection and treatment of oscillatory and/or stiff ordinary differential equations
[COO-2383-0068] N81-14759

DIFFERENTIAL PRESSURE
Air/gas system dynamics of fossil fuel power plants. Volume 3: Experimental pressure test data of a 500 MW unit and of a 125 MW unit
[EPRI-CS-1444-VOL-3] N81-14478

DIFFERENTIAL THERMAL ANALYSIS
Determination of phase transformation temperatures of titanium-nickel using differential thermal analysis
[AD-A091792] N81-14062

DIFFRACTION
Diffractive photon dissociation on hydrogen (Fermilab Experiment 612)
[DOE/ER-02232/87] N81-14808
Imaging of surfaces and defects of crystals
[DOE/ER-02995/4] N81-14903

DIFFRACTION PATTERNS
Volumetric pattern prediction of antennas on aircraft using the geometrical theory of diffraction
[DFVLR-FB-80-01] N81-14195
Measurement of the harmonic content across a bounded ultrasonic beam
[AD-A091646] N81-14798

DIFFUSERS
Compressor configuration and design optimization for the high reliability gas turbine
[DOE/ET-15425/T1] N81-14327

DIFFUSION
Numerical solution of an advection-diffusion equation for a dissolved species in a pulsating crack
[NPL-DNACS-28/80] N81-14025
Nerve impulse propagation in a branching nerve system: A simple model
[MC-TW-203/80] N81-14617

DIFFUSION COEFFICIENT
The drift, diffusion, and reactions of slow ions in gases
[AD-A091683] N81-14034
Electrochemistry of acetylides, nitrides and carbon cathodes in molten halides
[DOE/ER-04445/T1] N81-14041
The effects of radiating impurities and Boehm transport in a cool plasma mantle
[TRITA-PFU-80-05] N81-14865
Mechanism for diffusion induced grain boundary migration
[DOE/ER-05002/13] N81-14904

DIFFUSION FLAMES
Measurements of fluctuating density and temperature in an axisymmetric flame
[AASU-342] N81-14028

DIGITAL COMPUTERS
Random variate generation: A survey
[AD-A091343] N81-14774

DIGITAL DATA
Digital data reduction algorithm for oscillatory signals with an application to L-instability
[VTH-LR-298] N81-14194
Digital Data Recording System (DDRS) operating and maintenance manual
[NASA-CR-160894] N81-14288

DIGITAL FILTERS
A two-stage nonrecursive filter/decimator
[SAND-80-0891] N81-14639
Applications of the Fast Fourier Transform. Citations from the NTIS data base
[PB80-815491] N81-14677

DIGITAL SYSTEMS
Role of the sectionalized Fourier Transform in high-speed coherence processing
[AD-A091419] N81-14636
Studies of some algorithms for digital picture processing
[TRITA-NA-8003] N81-14656

A review of control theory for digital systems
[RR-120] N81-14685

DIHYDRIDES
Isotope effect on hydrogen site energies for two metal dihydrides
[SAND-79-1541C] N81-14039

DIMERS
Development of empirical potential functions for the study of molecular geometry and applications to chlorophyll a dimers
[DOE/ER-02837-T1] N81-14810

DIODES
Application of microfabrication technology to thermionic energy conversion
[DOE/ET-15423/4] N81-14431
Advanced ion implantation techniques
[BMFT-FB-T-79-37] N81-14897

DIPOLE MOMENTS
Electrochromic glasses
[AD-A091641] N81-14088

DIRECT LIFT CONTROLS
Theoretical investigation of the influence of spoiler dynamics on the handling qualities of an aircraft with direct lift control
[DFVLR-FB-80-07] N81-13975

DIRECTIONAL ANTENNAS
Adaptive Antenna Control (AAC) program
[AD-A091764] N81-14197

DIRECTIONAL CONTROL
The collision course: Conditions, guidance laws and properties
[DFVLR-FB-80-06] N81-13942

DISARMAMENT
Internal seismological stations for monitoring a comprehensive test ban theory
[FOA-C-20358-T1] N81-14535

DISCHARGE COEFFICIENT
Primary calibrations of critical flow venturi nozzles in high-pressure gas
[NEL-666] N81-14270

DISCRETE FUNCTIONS
Nonlinear grid error effects on numerical solution of partial differential equations N81-14704
On a class of explicit three-step Runge-Kutta methods with extended real stability intervals
[MC-NW-77/79] N81-14734

DISLOCATIONS (MATERIALS)
Kinetic processes at grain boundaries
[DOE/ER-05002/11] N81-14905

DISPLACEMENT
Improved polymers for enhanced oil recovery synthesis and rheology
[DOE/BETC-5603/10] N81-14089

DISPLAY DEVICES
Evaluation of a computer-generated perspective tunnel display for flight path following
[NASA-TP-1736] N81-13958
System for a displaying at a remote station data generated at a central station and for powering the remote station from the central station
[NASA-CASE-GSC-12411-1] N81-14221
A grainless focusing screen for cameras, microscopes and other optical instruments
[TDB-347] N81-14834
Multiplex operation with passive displays
[BMFT-FB-T-80-017] N81-14835

DISSOCIATION
Surface magnetic field/laser synergistic effects on the predissociation of adsorbed diatomic molecules
[AD-A091747] N81-14306
Ammonia as a hydrogen energy-storage medium
[BNL-28293] N81-14477
Diffractive photon dissociation on hydrogen (Fermilab Experiment 612)
[DOE/ER-02232/87] N81-14808

DISTILLATION
Alcohol production from agricultural and forestry residues
[DOE/EV-0108] N81-14125

DISTRIBUTION
Hierarchial distribution modeling with routing costs
[MC-BW-117/80] N81-14780

DISTRIBUTION FUNCTIONS
Random variate generation: A survey
[AD-A091343] N81-14774

DOCUMENTATION
Documentation of and information on protective rights relating to government support on 'technological research and development
[BMFT-FB-T-79-186] N81-14918

DOMESTIC ENERGY
An energy and cost analysis of residential heat pumps in northern climates
[DOE/TIC-11275] N81-14462
Strategic cost-benefit analysis of energy policies: Comparative analysis
[BNL-51128] N81-14469
Six kilowatt, residential photovoltaic power systems study; design, performance, economics, market potential
[UCID-18776] N81-14487

DOPPLER EFFECT
Troposcatter antenna positioner
[AD-A091778] N81-14198
Wide angle Michelson Doppler imaging interferometer --- measuring atmospheric emissions N81-14949

DOSIMETERS
Development and application of the electrochemical etching technique
[DOE/EV-04814/T1] N81-14043

DOWNWASH
Downwash calculation at close range behind a trapezoidal wing in supersonic flow
[FFA-TN-AU-1661] N81-13925

DRAG CHUTES
A contribution to stabilization of flight vehicle parachute systems
[DFVLR-MITT-80-05] N81-13926

DRAG REDUCTION
Laminar-airfoils for transport aircraft
[DFVLR-MITT-80-07] N81-13952

DRIFT (INSTRUMENTATION)
Operation of multiwire drift chambers (MWDCs) in the QDD and QDQ focal planes
[INTERIKO-80/1] N81-14290

DROPS (LIQUIDS)
A theory of droplet combustion at high pressures
[SAND-80-0081] N81-14040

DUALITY THEOREM
Duality in polynomial models with some applications to geometric control theory
[MC-BW-115/79] N81-14682

DUCTS
Evaporation duct effects on maximum intercept range for 18-1 and 37.5-GHz emitters. A theoretical analysis of expected frequency distributions of intercept range for five oceanic areas
[AD-A091724] N81-14205

DUST
Lidar observations at 0.7-micrometers and 10.6 micrometers wavelengths during smoke week 2
[AD-A091561] N81-14382
The effect of soiling on solar mirrors and techniques used to maintain high reflectivity
[SAND-79-2422] N81-14415

DYADICS
On the correspondence between two-dimensional real vector functions and functions of a complex variable and its application in electromagnetics
[REPT-S-112] N81-14223

DYE LASERS
Energy transfer and quenching rates of laser-pumped electronically excited alkalis in flames
[NASA-TM-82230] N81-14303
Dye lasers. Citations from the NTIS data base
[PB80-813819] N81-14311
Dye lasers. Citations from the NTIS data base
[PB80-813801] N81-14312

DYES
Application of foams to the processing of fabrics, phase 3
[DOE/CS-40056/T2] N81-14093

DYNAMIC CHARACTERISTICS
A contribution to stabilization of flight vehicle parachute systems
[DFVLR-MITT-80-05] N81-13926
Mass synthesis for multiple balancing criteria of complex, planar mechanisms N81-14321

DYNAMIC PRESSURE
Advanced ejection seat for high dynamic pressure escape. Wind tunnel test
[AD-A091810] N81-13940

DYNAMIC PROGRAMMING
Performed evaluation of unconstrained optimization techniques
[DFVLR-MITT-79-21] N81-14680

DYNAMIC RESPONSE
The effects of warhead-induced damage on the aeroelastic characteristics of lifting surfaces. Volume 1: Aeroelastic effects
[AD-A091674] N81-13955
Temperature sensitive dynamic cushioning function development and validation for aircap cellular polyethylene
[AD-A091604] N81-14086
Vibration characteristics of a steadily rotating slender ring
[NASA-TP-1775] N81-14343
Nonlinear dynamic response of a uni-directional model for the tile/pad space shuttle thermal protection system
[NASA-TM-81901] N81-14345
A general calculation method for the dynamic response to discrete gust distributions as exemplified by the rotorblade of a wind energy converter
[DFVLR-FB-80-12] N81-14408

DYNAMIC STRUCTURAL ANALYSIS
Finite element structural model of a large, thin, completely free, flat plate --- for large space structures
[NASA-TM-81887] N81-13992
Design criteria for deflection capacity of conventionally reinforced concrete slabs. Phase 3: Summary of design criteria and design and construction details; design examples
[AD-A091616] N81-14177
Control and dynamics study for the satellite power system. Volume 1: MPTS/SPS collector dynamic analysis and surface deformation
[NASA-CR-163826] N81-14395

E

EARTH (PLANET)
Life from a plantary perspective: Fundamental issues in global ecology N81-14503

EARTH ATMOSPHERE
Environmental impacts of the satellite power system (SPS) on the middle atmosphere
[NASA-TM-82228] N81-14508
Mitigating strategies for CO2 problems
[DOE/EV-10281/T2] N81-14511
Role of Organic Soils in the World Carbon: Problem Analysis and Research Needs
[DOE/EV-10040/2] N81-14516

EARTH MANTLE
Theoretical investigation of lunar and planetary interiors
[NASA-CR-163822] N81-14365
Convection, composition and the thermal state of the lower mantle N81-14366
Hotspots, basalts and the evolution of the mantle N81-14368

EARTH RESOURCES PROGRAM
Earth Resources: a continuing bibliography with indexes
[NASA-SP-7041(27)] N81-14371

EARTH SURFACE
Basaltic volcanism contribution N81-14369

ECHO SOUNDING
Surface based remote sensing in marine air. Extensive analysis of echoes by several sensors reveals evolutionary atmospheric processes related to weather capable of affecting naval operations
[AD-A091518] N81-14584

ECOLOGY
Life from a plantary perspective: Fundamental issues in global ecology N81-14503

ECONOMIC ANALYSIS
Economic evaluation of flying-qualities design criteria for a transport configured with relaxed static stability
[NASA-TP-1760] N81-13968
Energy policy study. Volume 10: Nuclear power regulation
[DOE/EIA-0201/10] N81-14423
Summary of solar energy technology characterizations
[DOE/EV-0099] N81-14450

ECONOMIC FACTORS
Energy analysis of solar energy systems, heat pumps and of improved insulation of single family houses
[BMFT-FB-T-79-101] N81-14403

Technical and management support for the development of small wind systems: FY 1980 program summary
[RFP-3121/3533/80/8] N81-14476
Community energy self-reliance
[SERI/CP-354-421] N81-14481
Information and guidelines for a proposed laboratory accreditation and product certification program for photovoltaic energy conversion systems
[PB80-217615] N81-14501
Conceptual framework for describing selected urban and community impacts of federal energy policies
[PNL-3492] N81-14929

ECONOMIC IMPACT
Foresight. Volume 3: The economic impact of energy conservation
[GPO-41-483] N81-14390

ECOSYSTEMS
Global energy futures and the carbon dioxide problem N81-14502

EDDY CURRENTS
Experimental modeling of laminar composites for multifrequency eddy current measurements
[BDX-613-2462] N81-14014

EDGES
Elastodynamic analysis of an edge-crack normal to the free surface of a half-space N81-14342
Analysis and development of image statistics and redundancy removal
[AD-A091600] N81-14381

EDITING
Refinements to the Boolean approach to automatic data editing
[ORNL/TM-7156] N81-14925

EDITING ROUTINES (COMPUTERS)
Refinements to the Boolean approach to automatic data editing
[ORNL/TM-7156] N81-14925

EFFECTIVE PERCEIVED NOISE LEVELS
The rating of helicopter noise: Development of a proposed impulse correction
[NPL-AC-93] N81-14792

EFFICIENCY
Problems used in testing the efficiency and accuracy of the modified Gram-Schmidt least squares algorithm
[PB80-219777] N81-14672
Behadur efficiency and small-sample efficiency: A numerical study
[MC-SW-68/80] N81-14764

EFFLUENTS
Development of a simple fluidized-bed coal combustion model for the assessment of a pressurized fluidized-bed combustion system for electrical power generation
[DOE/METC/SP-80/15] N81-14044
Support studies in fluidized-bed combustion
[PB80-218613] N81-14056
Assessment of the visibility impairment caused by the emissions from the proposed power plant at Boron, California
[NASA-CR-163103] N81-14504
Proceedings of the workshop on Modification of the Upper Atmosphere by Satellite Power System (SPS) Propulsion Effluents
[CONF-7906180] N81-14548
Automated emergency meteorological response system
[DP-MS-80-81] N81-14592

EIGENVALUES
Improving the accuracy of computed matrix eigenvalues
[ANL-80-84] N81-14761
Inequalities connecting eigenvalues and nonprincipal subdeterminants
[AD-A091503] N81-14786

EIGENVECTORS
Free-stream disturbances, continuous eigenfunctions, boundary-layer instability and transition
[NASA-CR-163828] N81-14266
On the geometry of multivariable root-loci
[RR-118] N81-14748
Forced and free magnetoacoustic oscillations of toroidal argon plasmas
[IPF-8-3] N81-14852

EJECTION SEATS
Advanced ejection seat for high dynamic pressure escape. Wind tunnel test
[AD-A091810] N81-13940

ELASTIC PROPERTIES
Refined theory for bending of perforated plates
[WTHD-125] N81-14352
J-integral elastic plastic fracture mechanics evaluation of the stability of cracks in nuclear reactor pressure vessels
[SAND-80-0688] N81-14357

ELASTIC SCATTERING
Quasi elastic light scattering from macromolecules in solution
[CISE-1528] N81-14083

ELASTIC WAVES
On one-dimensional acceleration waves in composite materials modeled as interpenetrating solid continua
[AD-A091615] N81-14011

ELASTODYNAMICS
Elastodynamic analysis of an edge-crack normal to the free surface of a half-space N81-14342

ELASTOMETERS
Service life determination for the UH-60-A (UTTAS) helicopter elastomeric bearings
[AD-A091756] N81-14324

ELECTRETS
Thermally stimulated discharge currents from sodium nitrate doped polyacrylonitrile
[AD-A091638] N81-14248

ELECTRIC AUTOMOBILES
Regenerative flywheel energy storage system. Volume 1: Executive summary
[UCRL-15290-VOL-1] N81-14484
Regenerative flywheel storage system, volume 2
[UCRL-15290-VOL-2] N81-14485
Regenerative flywheel energy storage system. Volume 3: Life cycle and cost-benefit analysis of a battery-flywheel electric car
[UCRL-15290-VOL-3] N81-14486

ELECTRIC BATTERIES
Production technology of beta-alumina ceramics for Na/S batteries
[BMFT-FB-T-79-57] N81-14402
Electrochemical and surface analysis of the reactive interfaces in the Li (Si)/FeS2 primary battery
[SAND-79-2155] N81-14413
Research, development and demonstration of lead-acid batteries for electric vehicle propulsion
[ANL/OEPM-79-9] N81-14933

ELECTRIC BRIDGES
Electrothermal response testing of electroexplosive devices with electrically conducting explosives
[SAND-80-0231] N81-14112

ELECTRIC COILS
Equilibrium field coils for the Engineering Test Facility: Shaping the plasma cross section
[ORNL/TM-7339] N81-14886

ELECTRIC CONTROL
An investigation of a digital electrohydraulic servovalve
[AD-A091563] N81-14326

ELECTRIC CURRENT
Realization of the ampere, and measurement of the gyromagnetic ratio of the proton
[NPL-DES-59] N81-14803

ELECTRIC DISCHARGES
Thermally stimulated discharge currents from sodium nitrate doped polyacrylonitrile
[AD-A091638] N81-14248

ELECTRIC ENERGY STORAGE
Development of molten carbonate fuel cell power plant technology
[DOE/ET-15440/2] N81-14432
Synthesis of research and development in mechanical energy storage technologies
[DOE/ET-16106/T1] N81-14439
Security assessment of power systems
[DOE/ET-29100/11] N81-14447
Regenerative flywheel energy storage system. Volume 3: Life cycle and cost-benefit analysis of a battery-flywheel electric car
[UCRL-15290-VOL-3] N81-14486

ELECTRIC FIELDS
Investigations and developments on a Hall-Ion-Thruster
[DFVLR-FB-80-09] N81-13994
Study of electric field and ion effects on HVDC lines
[DOE/RA-50153/1] N81-14253
Operation of multiwire drift chambers (MWDCs) in the QDD and QDQ focal planes
[INTERIKO-80/1] N81-14290
Rocket measurements of electric fields, electron density and temperature during the three phases of auroral substorms
[TRITA-EPP-79-22] N81-14859

ELECTRIC GENERATORS
Industrial cogeneration case studies
[EPRI-EM-1531] N81-14467
District heating/cogeneration application studies for Minneapolis-St. Paul area. Modifications of the existing units at the High Bridge Power Plant to cogeneration for hot water district heating
[ORNL/TM-6830/P9] N81-14474

ELECTRIC MOTOR VEHICLES
Sound source location measurements on high speed trains
[DFVLR-MITT-79-15] N81-14791
The case against electric vehicles is running out of gas
[SAND-79-1770] N81-14928
Research, development, and demonstration of lead-acid batteries for electric vehicle propulsion
[ANL/OEPM-79-8] N81-14930
Research, development, and demonstration of nickel iron batteries for electric vehicle propulsion
[ANL/OEPM-79-14] N81-14932
Research, development and demonstration of lead-acid batteries for electric vehicle propulsion
[ANL/OEPM-79-9] N81-14933

ELECTRIC POWER
Regenerative flywheel storage system, volume 2
[UCRL-15290-VOL-2] N81-14485

ELECTRIC POWER PLANTS
BICYCLE: A comptuer code for calculating levelized life-cycle costs
[LA-8493-MS] N81-14341
Conversion to coal and coal/oil firing
[ICTS/TR-07] N81-14405
The RETE project. Integrated public and private cogeneration
[CISE-1527] N81-14406
Technology characterizations: Environmental information handbook
[DOE/EV-0072] N81-14426
Development of molten carbonate fuel cell power plant technology
[DOE/ET-15440/2] N81-14432
Development of molten carbonate fuel cell power plant
[DOE/ET-17019/1] N81-14436
Alternate central receiver power system program, phase 2. Volume 1: Commercial plant design refinement
[DOE/SF-10535/1-1] N81-14460
Air/gas system dynamics of fossil fuel power plants. Volume 3: Experimental pressure test data of a 500 MW unit and of a 125 MW unit
[EPRI-CS-1444-VOL-3] N81-14478
Proceedings of the Depeartment of Energy Advanced Gas Turbine Central Power Systems Workshop
[CONF-8004103] N81-14479
Distributed energy systems: A review of related technologies
[DOE/PE-03871/01] N81-14488
Solar thermal power systems
[DOE/CS-21036/01] N81-14489
Geothermal energy. Citations from the Engineering Index data base
[PB80-814684] N81-14496
Assessment of the visibility impairment caused by the emissions from the proposed power plant at Boron, California
[NASA-CR-163103] N81-14504

ELECTRIC POWER TRANSMISSION
Commercialization strategy for lead/acid batteries in utility load leveling applications
[DOE/ET-26934/1] N81-14448
Magnetic energy storage
[LA-UR-80-2589] N81-14473

ELECTRIC PROPULSION
Research, development and demonstration of nickel-zinc batteries for electric vehicle propulsion
[ANL/OEPM-79-11] N81-14480
Field emission electric propulsion ion optics of slit emitters and beam focussing
[CLM/RR/E1/28] N81-14836

ELECTRIC SWITCHES
Semiconductor crosspoints for direct replacement of electromechanical switches with high voltage requirements
[BMFT-FB-T-79-44] N81-14229

ELECTRIC WIRE
On the improvement of miniature pyrotechnic devices for space application
[ESA-CR(P)-1296] N81-14105

ELECTRICAL IMPEDANCE
Calculation of traveling-wave wire antenna arrays with mutual impedances
[REPT-S-111] N81-14191

ELECTRICAL MEASUREMENT
Experimental modeling of laminar composites for multifrequency eddy current measurements
[BDX-613-2482] N81-14014

An optical watthour meter digitizer
[ORNL/TM-7355] N81-14296

ELECTRICAL PROPERTIES
Electronic and optical properties and modeling of intercalated graphite
[AD-A091858] N81-14009

Photovoltaic mechanisms in polycrystalline thin film solar cells
[DOE/ET-23106/2] N81-14441

ELECTRICAL RESISTANCE
Lead acid battery pulse discharge investigation
[DOE/CH-00128/1] N81-14427

ELECTRICAL RESISTIVITY
Investigation of electrochromic effects for display application
[BMFT-FB-T-79-42] N81-14022

Interpretation of dipole-dipole electrical resistivity survey, Colado geothermal area, Pershing County, Nevada
[DOE/ID-12079/11] N81-14252

Applications of time series analysis to geophysical data
[PB80-213978] N81-14551

A computer simulation on microinstabilities and anomalous resistivity near the magnetic neutral sheet
[IJP-487] N81-14845

Observations of neoclassical and anomalous resistivity in toroidal discharges
[DOE/ET-53051/4] N81-14879

ELECTRICITY
Market definition study of photovoltaic power for remote villages in developing countries
[NASA-CR-159880] N81-14391

ELECTRO-OPTICS
Stragetic laser communications program. Volume 1: Proceedings of the Navy/DARPA Fourth Technical Interchange Meeting
[AD-A091619] N81-14201

Experimental and analytical development of the application of a transit laser velocimeter
[AD-A091762] N81-14302

ELECTROCARDIOGRAPHY
Subcutaneous electrode structure
[NASA-CASE-ARC-11117-1] N81-14612

ELECTROCHEMICAL CORROSION
Development and application of the electrochemical etching technique
[DOE/EV-04814/T1] N81-14043

ELECTROCHEMICAL MACHINING
Electro-chemical polishing of cobalt in ethylene glycol and dimethyl formamide solutions of cobalt chloride
[PNR-90027] N81-14173

Electrochemical machining in-process data collection and control
[Y-2209] N81-14180

ELECTROCHEMISTRY
Electrochemistry of acetylides, nitrides and carbon cathodes in molten halides
[DOE/ER-04445/T1] N81-14041

Electrochemical methods of chemical analysis. Citations from the NTIS data base
[PB80-815053] N81-14057

Development of a crude gas/air fuel cell system
[BMFT-FB-T-79-103] N81-14404

ELECTRODEPOSITION
Electrodeposition of polycrystalline and amorphous silicon for photovoltaic applications
[DOE/ET-23046/3] N81-14443

ELECTRODES
Unidirectional composites as electrodes/preionization sources for CO2 tea lasers
[AD-A091407] N81-14012

Work function investigations at electrodes with adsorbed layers by measuring contact potential differences in vapor atmosphere
[DFVLR-FB-79-22] N81-14242

Research on alkaline zinc secondary electrodes with emphasis on model
[DOE/RL-90369/8] N81-14257

Characterizing and improving the toughness of thick-sectioned 21/4Cr-1Mo electroslag weldments
[DOE/ET-12313/T1] N81-14344

Application of microfabrication technology to thermionic energy conversion
[DOE/ET-15423/4] N81-14431

Effects of several trace contaminants on fuel cell performance
[DOE/METC/RI-80/16] N81-14455

MHD electrode development
[DOE/ET-15529/T1] N81-14875

Research, development, and demonstration of lead-acid batteries for electric vehicle propulsion
[ANL/OEPM-79-8] N81-14930

Research, development, and demonstration of nickel iron batteries for electric vehicle propulsion
[ANL/OEPM-79-14] N81-14932

ELECTRODIALYSIS
A 25 kW solar photovoltaic flat panel power supply for an electrodialysis water desalination unit in New Mexico
[DOE/ET-23061/1] N81-14444

ELECTROLYSIS
Combined Electrolysis Catalytic Exchange (CECE)
[MLM-2774] N81-14051

ELECTROLYTES
Electro-chemical polishing of cobalt in ethylene glycol and dimethyl formamide solutions of cobalt chloride
[PNR-90027] N81-14173

Effects of several trace contaminants on fuel cell performance
[DOE/METC/RI-80/16] N81-14455

Research, development, and demonstration of lead-acid batteries for electric vehicle propulsion
[ANL/OEPM-79-8] N81-14930

Research, development, and demonstration of nickel iron batteries for electric vehicle propulsion
[ANL/OEPM-79-14] N81-14932

ELECTROMAGNETIC ABSORPTION
Investigation of electrochromic effects for display application
[BMFT-FB-T-79-42] N81-14022

ELECTROMAGNETIC COMPATIBILITY
Applications of multiconductor transmission line theory to the prediction of cable coupling: Volume 8. Prediction of cross talk involving braided shield cables
[AD-A091751] N81-14200

ELECTROMAGNETIC FIELDS
On the correspondence between two-dimensional real vector functions and functions of a complex variable and its application in electromagnetics
[REPT-S-112] N81-14223

ELECTROMAGNETIC INTERFERENCE
A survey of simulation and test results for assessing RPV performance in a WBIC environment
[AD-A091603] N81-13954

Threshold signal reception in electromagnetic interference environment. Part 1: Problems and approaches
[PB80-218753] N81-14216

Performance degradation of a 7400 TTL NAND gate due to sinusoidal interference
[AD-A091745] N81-14249

ELECTROMAGNETIC RADIATION
Evaporation duct effects on maximum intercept range for 18-1 and 37.5-GHz emitters. A theoretical analysis of expected frequency distributions of intercept range for five oceanic areas
[AD-A091724] N81-14205

Linear mode conversion in a toroidal plasma
[TRITA-PFU-80-06] N81-14855

ELECTROMAGNETIC SCATTERING
Magneto-optic materials for biasing ring laser gyros. Computer model evaluating scattering from multilayer dielectric thin film structures containing a magnetic layer
[AD-A091540] N81-14293

ELECTROMAGNETIC WAVE TRANSMISSION
Design of a high power 240 GHz gyromonotron
[AD-A091511] N81-14250

ELECTROMAGNETISM
Activities of the Radio Laboratory, 1977
[REPT-S-110] N81-14190

ELECTRON ACCELERATORS
Development and application of the electrochemical etching technique
[DOE/EV-04814/T1] N81-14043

ELECTRON BEAMS
TEBPP: Theoretical and Experimental study of Beam-Plasma-Physics N81-14952

ELECTRON CAPTURE
Research on atomic and molecular physics
[DOE/ER-06027/2] N81-14818

ELECTRON CYCLOTRON HEATING
Experiments in the ISX-B Tokamak: ECRH ripple studies, pellet fueling, impurity flow reversal, and surface physics
[IAEA-CN-38/A-5] N81-14882

Currents induced in Tokamaks by electron cyclotron heating
[ORNL/TM-7503] N81-14888

ELECTRON DENSITY (CONCENTRATION)
Numerical simulation of density evolution in JIPP T-2 Tokamak
[IPPJ-483] N81-14841

Microscopic theory of dynamical correlations in the metallic electron liquid N81-14896

ELECTRON ENERGY
Electron energy loss spectrometry
[BMFT-FB-T-79-181] N81-14802

Heavy ion beam probing
[DOE/ET-53004/2] N81-14822

Rocket measurements of electric fields, electron density and temperature during the three phases of auroral substorms
[TRITA-EPP-79-22] N81-14859

An experimental study of unipolar arcs in a low pressure mercury discharge
[DOE/ET-51010/8] N81-14871

Currents induced in Tokamaks by electron cyclotron heating
[ORNL/TM-7503] N81-14888

ELECTRON GAS
Microscopic theory of dynamical correlations in the metallic electron liquid N81-14896

ELECTRON IMPACT
Enhanced interaction of the solar wind and the interstellar neutral gas by virtue of a critical velocity effect
[TRITA-EPP-79-19] N81-14942

ELECTRON MICROSCOPES
Electrochemical and surface analysis of the reactive interfaces in the Li (Si)/FeS2 primary battery
[SAND-79-2155] N81-14413

ELECTRON PARAMAGNETIC RESONANCE
Isotope effect on hydrogen site energies for two metal dihydrides
[SAND-79-1541C] N81-14039

Electron paramagnetic resonance of material properties and processes
[SAND-80-1230C] N81-14807

Electron spin resonance of homozygous beta thalassemic plasma
[ISS-P-79/13] N81-14850

ELECTRON PLASMA
Model for ion confinement in a hot-electron tandem mirror anchor
[UCID-18802] N81-14894

Microscopic theory of dynamical correlations in the metallic electron liquid N81-14896

ELECTRON SCATTERING
Experimental studies of electron impact depopulation of excited states of atoms: Applications to laser development for fusion and isotope separation
[DOE/ES-04199/1] N81-14816

Research on atomic and molecular physics
[DOE/ER-06027/2] N81-14818

ELECTRON SPECTROSCOPY
Electron energy loss spectrometry
[BMFT-FB-T-79-181] N81-14802

ELECTRON STATES
Isotope effect on hydrogen site energies for two metal dihydrides
[SAND-79-1541C] N81-14039

ELECTRON TRANSITIONS
Laser excitation of fluorescence in the A-X system of NH
[NASA-TM-82231] N81-14304
X-ray lasers. Citations from the International Aerospace Abstracts data base
[NASA-CR-163834] N81-14315
ELECTRONIC EQUIPMENT
The Federal Aviation Administration lightning protection modules designed for leadless devices
[AD-A091642] N81-13939
Development of an electronic timepiece for technical applications
[BMFT-FB-T-79-88] N81-14232
Operation of multiwire drift chambers (MWDCs) in the QDD and QDQ focal planes
[INTERIKO-80/1] N81-14290
ELECTRONIC MODULES
Method and apparatus for fabricating improved solar cell modules
[NASA-CASE-NPO-14416-1] N81-14389
ELECTRONIC PACKAGING
Bubble memory module
[NASA-CR-3380] N81-13993
Development of high complexity linear integrated circuits
[BMFT-FB-T-79-36] N81-14225
ELECTRONICS
Investigation of the interaction between the power electric circuit and power supply systems
[BMFT-FB-T-79-115] N81-14235
ELECTROPLATING
Prevention of spline wear by soft metallic coatings --- aircraft engines
[AD-A091861] N81-14064
ELECTROSLAG WELDING
Characterizing and improving the toughness of thick-sectioned 21/4Cr-1Mo electroslag weldments
[DOE/ET-12313/T1] N81-14344
ELECTROSTATIC WAVES
Linear mode conversion in a toroidal plasma
[TRITA-PFU-80-06] N81-14855
Tokamak currents driven by weak electrostatic waves
[DOE/ET-53036/18] N81-14880
ELECTROSTATICS
Studies of electrostatic double layers with applications to cosmic plasmas
[TRITA-EPP-80-03] N81-14861
ELEMENTARY PARTICLES
Gauge theories and spontaneous symmetry breaking
[AD-A091800] N81-14804
Research in elementary particle physics
[DOE/ER-03230/T1] N81-14813
ELEVONS
Effects of the Shuttle Orbiter fuselage and elevon on the molecular distribution of water vapor from the flash evaporator system N81-14155
ELLIPSES
Stress intensity factors for cracks with circular and elliptic crack fronts, determined by 3D finite element methods --- corner, surface, and embedded cracks in cuboid blocks
[PNR-90035] N81-14349
ELLIPSOIDS
Unsteady pressure distribution measurement on a rotating ellipsoid
[DFVLR-FB-80-18] N81-13927
ELLIPTIC DIFFERENTIAL EQUATIONS
Application of the multigrid method to grid generation N81-14718
EMISSION
Investigation of nuclear structure and nuclear reactions induced by complex projectiles
[DOE/ER-04052/T1] N81-14826
EMISSION SPECTRA
Possibilities and limitations of Raman spectroscopy in local temperature and concentration measurements in flames
[DFVLR-FB-80-17] N81-14030
EMITTERS
Field emission electric propulsion ion optics of slit emitters and beam focussing
[CLM/RR/E1/28] N81-14836
EMPLOYMENT
Solar energy employment and requirements, 1978 - 1985. Summary and highlights
[DOE/TIC-1154] N81-14461
EMULSIONS
Reduction of exhaust smoke from gas-turbine engines by using fuel emulsions
[AD-A091777] N81-13953
ENDOCRINOLOGY
Computerized tomographic determination of spinal bone mineral content
[NASA-CR-160891] N81-14615
ENERGETIC PARTICLES
The chemistry of energetic fragments
[AD-A091823] N81-14031
Measurement of visible and UV emission from Energetic Neutral Atom Precipitation (ENAP), on Spacelab N81-14948
Spacelab energetic ion mass spectrometer N81-14950
ENERGY BUDGETS
System techniques, satellites, orbit design, thermal control, power supply, attitude control, telemetry system
[DFVLR-FB-79-37] N81-13984
ENERGY CONSERVATION
An optical watthour meter digitizer
[ORNL/TM-7355] N81-14296
Foresight. Volume 3: The economic impact of energy conservation
[GPO-41-483] N81-14390
Predesign energy analysis: A new graphic approach to energy conscious design for buildings
[DOE/CS-0171] N81-14449
Strategic cost-benefit analysis of energy policies: Comparative analysis
[BNL-51128] N81-14469
Two well storage systems for combined heating and airconditioning by groundwater heatpumps in shallow aquifers
[LBL-11302] N81-14472
Relevance of the second law of thermodynamics to energy conservation, volume 2
[DOE/CS-40178/1-VOL-2] N81-14906
A report on the relevance of the second law of thermodynamics to energy conservation
[PB80-216914] N81-14913
ENERGY CONSUMPTION
An optical watthour meter digitizer
[ORNL/TM-7355] N81-14296
Low energy futures for the United States
[DOE/PE-0020] N81-14456
ENERGY CONVERSION
Electrochemistry of acetylides, nitrides and carbon cathodes in molten halides
[DOE/ER-04445/T1] N81-14041
Methane recovery from coalbeds. Project plan document, FY 1981
[DOE/TIC-11269] N81-14127
Work function investigations at electrodes with adsorbed layers by measuring contact potential differences in vapor atmosphere
[DFVLR-FB-79-22] N81-14242
District heating/cogeneration application studies for Minneapolis-St. Paul area. Modifications of the existing units at the High Bridge Power Plant to cogeneration for hot water district heating
[ORNL/TM-6830/P9] N81-14474
Technical and management support for the development of small wind systems
[RFP-3126/3533/80/2] N81-14475
ENERGY CONVERSION EFFICIENCY
Neodymium YAG lasers. Citations from the International Aerospace Abstracts data base
[NASA-CR-163835] N81-14316
Development of a crude gas/air fuel cell system
[BMFT-FB-T-79-103] N81-14404
Solar mirror materials: Their properties and uses in solar concentrating collectors
[SAND-79-2190] N81-14412
Study of seed reprocessing systems for open cycle coal fired MHD power plants. Task 1: Selection of processes for more detailed study
[DOE/ET-15613/T1] N81-14435
Thin film cadmium telluride solar cells
[DOE/ET-23009/T10] N81-14438
Photovoltaic mechanisms in polycrystalline thin-film silicon solar cells
[DOE/ET-23108/3] N81-14442
Thin film cadmium telluride solar cells
[DOE/ET-23009/T11] N81-14446
ENERGY DISSIPATION
Electron energy loss spectrometry
[BMFT-FB-T-79-181] N81-14802
ENERGY LEVELS
Pion interactions at medium energies
[DOE/ER-03948/12] N81-14814
Investigation of nuclear structure and nuclear reactions induced by complex projectiles
[DOE/ER-04052/T1] N81-14826
ENERGY POLICY
Opportunities for coal to methanol conversion
[DOE/CS-50009/01] N81-14113
Gasification of disordered carbons (chars)
[DOE/ER-10488-1] N81-14115
Exploratory research on solvent refined coal liquefaction
[DOE/ET-14800/11] N81-14116
Investigation of sulfur-tolerant catalysts for selective synthesis of hydrocarbon liquids from coal derived gases
[DOE/ET-14809/3] N81-14118
Synthetic fuels and the environment: An environmental and regulatory impact analysis
[DOE/EV-0087] N81-14122
Coal Gasification Quarterly Report, April - June 1979
[DOE/FE-0002-79/2] N81-14126
Methane recovery from coalbeds. Project plan document, FY 1981
[DOE/TIC-11269] N81-14127
Progress in wood gasification at the University of Missouri-Rolla
[CONF-800973-1] N81-14128
Recycled program: Phase 1-Test procedures for recycled oil used as burned fuel
[PB80-215536] N81-14133
Geothermal energy development in the eastern United States: Evaluation of potential geothermal resource areas
[PB80-212806] N81-14386
Foresight. Volume 3: The economic impact of energy conservation
[GPO-41-483] N81-14390
Solar heating, cooling, and domestic hot water system installed at Kaw Valley State Bank and Trust Company, Topeka, Kansas
[NASA-CR-161595] N81-14393
Solar heating, cooling and domestic hot water system installed at Columbia Gas System Service Corporation, Columbus, Ohio
[NASA-CR-161603] N81-14394
Energy analysis of solar energy systems, heat pumps and of improved insulation of single family houses
[BMFT-FB-T-79-101] N81-14403
Development of a crude gas/air fuel cell system
[BMFT-FB-T-79-103] N81-14404
Conversion to coal and coal/oil firing
[ICTS/TR-07] N81-14405
Solar central receiver in perspective
[SAND-79-2154C] N81-14414
Regional conceptual design and analysis studies for residential photovoltaic systems, volume 2
[SAND-78-7040/2] N81-14416
Torque ripple in a Darrieus, vertical axis wind turbine
[SAND-80-0475] N81-14417
Thin film polycrystalline silicon solar cells
[DOE/ET-23047/4] N81-14420
Energy policy study. Volume 10: Nuclear power regulation
[DOE/EIA-0201/10] N81-14423
Energy information referral directory, second quarter 1980
[DOE/EIA-0205/80-2Q] N81-14424
Development of molten carbonate fuel cell power plant technology
[DOE/ET-15440/2] N81-14432
MHD coal-fired flow facility
[DOE/ET-10815/47] N81-14433
Coastal zone wind energy. Part 1: Synoptic and mesoscale controls and distributions of coastal wind energy
[DOE/ET-20274/7-PT-1] N81-14434
Study of seed reprocessing systems for open cycle coal fired MHD power plants. Task 1: Selection of processes for more detailed study
[DOE/ET-15613/T1] N81-14435
Solar photovoltaic/thermal residential experiment, phase 1
[DOE/ET-20279/103] N81-14437
Synthesis of research and development in mechanical energy storage technologies
[DOE/ET-16106/T1] N81-14439

Photovoltaic mechnisms in polycrystalline thin-films silicon solar cells
[DOE/ET-23108/5] N81-14440
Boron arsenide thin film solar cell development
[DOE/ET-23011/1] N81-14445
Thin film cadmium telluride solar cells
[DOE/ET-23009/T11] N81-14446
Predesign energy analysis: A new graphic approach to energy conscious design for buildings
[DOE/CS-0171] N81-14449
Summary of solar energy technology characterizations
[DOE/EV-0099] N81-14450
Decentralized solar photovoltaic energy systems
[DOE/EV-0101] N81-14451
The characterization and assessment of selected solar thermal energy systems for residential and process heat applications
[DOE/EV-0102] N81-14452
Technology assessment of wind energy conversion systems
[DOE/EV-0103] N81-14453
Low energy futures for the United States
[DOE/PE-0020] N81-14456
Alternate central receiver power system program, phase 2. Volume 1: Commercial plant design refinement
[DOE/SF-10535/1-1] N81-14460
An energy and cost analysis of residential heat pumps in northern climates
[DOE/TIC-11275] N81-14462
Industrial cogeneration case studies
[EPRI-EM-1531] N81-14467
Calcium/calcium chromate thermal battery and thermal battery assignment at the General Electric Neutron Devices Department
[GEPP-TIS-529] N81-14468
Strategic cost-benefit analysis of energy policies: Comparative analysis
[BNL-51128] N81-14469
District heating/cogeneration application studies for Minneapolis-St. Paul area. Modifications of the existing units at the High Bridge Power Plant to cogeneration for hot water district heating
[ORNL/TM-6830/P9] N81-14474
Quality-assurance needs and goals in solar energy conversion
[SERI/TP-641-773] N81-14483
Regenerative flywheel energy storage system. Volume 1: Executive summary
[UCRL-15290-VOL-1] N81-14484
Six kilowatt, residential photovoltaic power systems study; design, performance, economics, market potential
[UCID-18776] N81-14487
Distributed energy systems: A review of related technologies
[DOE/PE-03871/01] N81-14488
Solar thermal power systems
[DOE/CS-21036/01] N81-14489
SPS Energy Conversion Power Management Workshop
[NASA-CR-163840] N81-14491
Development of a low-cost black-liquid solar collector, phase 2
[DOE/CS-30171/2A] N81-14492
Geothermal energy. Citations from the Engineering Index data base
[PB80-814692] N81-14495
Geothermal energy: Technology and general studies. Citations from the NTIS data base
[PB80-814676] N81-14497
Geothermal energy development in the eastern Unites States geothermal space heating - Naval Air Rework Facility, Norfolk, Virginia
[PB80-217490] N81-14498
Geothermal energy development in the eastern United States. Geothermal space heating, Pittsville Middle/Elementary School, Pittsville, Maryland
[PB80-221088] N81-14499
Information and guidelines for a proposed laboratory accreditation and product certification program for photovoltaic energy conversion systems
[PB80-217615] N81-14501
Global energy futures and the carbon dioxide problem N81-14502
The environmental assessment of synfuels projects
[DOE/TIC-11286] N81-14512
Site insolation and wind power characteristics: Technical report Midwest region
[DOE/CS-20160-01-VOL-4] N81-14586
Site insolation and wind power characteristics: Technical report Western region (south section)
[DOE/CS-20160-01-VOL-6] N81-14587
Site insolation and wind power characteristics: Technical report Western region (north section)
[DOE/CS-20160/01-VOL-5] N81-14588
National mirror fusion program plan
[UCAR-10042-80] N81-14892
Technology of direct conversion for mirror reactor end-loss plasma
[UCRL-84235] N81-14893
Conceptual framework for describing selected urban and community impacts of federal energy policies
[PNL-3492] N81-14929

ENERGY REQUIREMENTS

Geothermal energy development in the eastern United States: Evaluation of potential geothermal resource areas
[PB80-212806] N81-14386
The RETE project. Integrated public and private cogeneration
[CISE-1527] N81-14406

ENERGY STORAGE

Atomic hydrogen storage method and apparatus
[NASA-CASE-LEW-12081-3] N81-14103
Solar thermal power systems
[DOE/CS-04042/1] N81-14429
Technology assessment of wind energy conversion systems
[DOE/EV-0103] N81-14453
Calcium/calcium chromate thermal battery and thermal battery assignment at the General Electric Neutron Devices Department
[GEPP-TIS-529] N81-14468
Magnetic energy storage
[LA-UR-80-2589] N81-14473
Regenerative flywheel energy storage system. Volume 1: Executive summary
[UCRL-15290-VOL-1] N81-14484

ENERGY TECHNOLOGY

Alcohol production from agricultural and forestry residues
[DOE/EV-0108] N81-14125
Market definition study of photovoltaic power for remote villages in developing countries
[NASA-CR-159880] N81-14391
Energy analysis of solar energy systems, heat pumps and of improved insulation of single family houses
[BMFT-FB-T-79-101] N81-14403
Development and preparation of industrial scale manufacturing processes for a modular solar-assisted house-heating-system, phase 2B
[BMFT-FB-T-79-85] N81-14407
Salt-gradient solar ponds: Design, construction and power production
[MLM-2770(OP)] N81-14409
Energy information referral directory, second quarter 1980
[DOE/EIA-0205/80-2Q] N81-14424
Technology characterizations: Environmental information handbook
[DOE/EV-0072] N81-14426
Low energy futures for the United States
[DOE/PE-0020] N81-14456
Technical and management support for the development of small wind systems: FY 1980 program summary
[RFP-3121/3533/80/8] N81-14476
Community energy self-reliance
[SERI/CP-354-421] N81-14481
Solar ponds. Citations from the NTIS data base
[PB80-814460] N81-14494
Geothermal energy: Technology and general studies. Citations from the NTIS data base
[PB80-814676] N81-14497
Alternative energy sources session ocean thermal energy conversion: Technology development
[PB80-218159] N81-14500
An evaluation of emission factors for waste-to-energy systems
[PB80-226665] N81-14521
A report on the relevance of the second law of thermodynamics to energy conservation
[PB80-216914] N81-14913

ENERGY TRANSFER

Energy transfer and quenching rates of laser-pumped electronically excited alkalis in flames
[NASA-TM-82230] N81-14303
Vibrational energy transfer kinetics in molecular disequilibrium
[DOE/ER-10458/1] N81-14815

ENGINE CONTROL

Power control for hot gas engines
[NASA-CASE-NPO-14220-1] N81-14318

ENGINE DESIGN

Advanced Technology Spark-Ignition Aircraft Piston Engine Design Study
[NASA-CR-165162] N81-13963
Application of fracture mechanics in assuring against fatigue failure of ceramic components
[PB80-213549] N81-14095

ENGINE INLETS

Prediction of sound radiated from different practical jet engine inlets
[NASA-CR-163824] N81-14789

ENGINE NOISE

Ray theory to predict the propagation of broadband fan noise
[PNR-90030] N81-14794

ENGINE PARTS

A resin injection technique for the fabrication of aero engine composite components
[PNR-90024] N81-14004

ENTHALPY

Enthalpy measurement of coal-derived liquids
[DOE/ET-13395/3-4] N81-14119

ENTROPY

Relevance of the second law of thermodynamics to energy conservation, volume 2
[DOE/CS-40178/1-VOL-2] N81-14908

ENUMERATION

A recursive approach to the implementation of enumerative methods
[MC-BW-116/80] N81-14728

ENVIRONMENT EFFECTS

Synthetic fuels and the environment: An environmental and regulatory impact analysis
[DOE/EV-0087] N81-14122
Alcohol production from agricultural and forestry residues
[DOE/EV-0108] N81-14125
Conversion to coal and coal/oil firing
[ICTS/TR-07] N81-14405
Technology characterizations: Environmental information handbook
[DOE/EV-0072] N81-14426
Summary of solar energy technology characterizations
[DOE/EV-0099] N81-14450
Decentralized solar photovoltaic energy systems
[DOE/EV-0101] N81-14451
Global energy futures and the carbon dioxide problem N81-14502
Environmental assessment for the Satellite Power System. Concept development and evaluation program: Effects of ionospheric heating on telecommunications
[DOE/ER-10003/T2] N81-14507
Environmental impacts of the satellite power system (SPS) on the middle atmosphere
[NASA-TM-82228] N81-14508
Mitigating strategies for CO2 problems
[DOE/EV-10281/T2] N81-14511
The environmental assessment of synfuels projects
[DOE/TIC-11286] N81-14512
Trace metals and Stationary Conventional Combustion Processes. Volume 1: Technical report
[PB80-216161] N81-14519
Trace metals and Stationary Conventional Combustion Processes. Volume 2: Bibliography
[PB80-216179] N81-14520
Proceedings of the workshop on Modification of the Upper Atmosphere by Satellite Power System (SPS) Propulsion Effluents
[CONF-7906180] N81-14548

ENVIRONMENT POLLUTION

Analytical model for a vertical buoyant jet
[ORNL/TM-7140] N81-14513

ENVIRONMENT PROTECTION

Nevada Nuclear Waste Storage Investigations: Quality
[NVO-196-17] N81-14830

ENVIRONMENT SIMULATORS
An effective combined environment test facility N81-14150
ENVIRONMENTAL CONTROL
Orbiter integrated active thermal control subsystem test N81-14144
ENVIRONMENTAL MONITORING
NOx national emission inventory estimates [PB80-224058] N81-14522
ENVIRONMENTAL TESTS
Air oxidation and seawater corrosion Hastelloy S and Hastelloy C-4 --- storage capsules for radioisotope heat source fuel [PNL-3344] N81-14072
ENVIRONMENTS
DOE/DOD environmental data bank index --- numerical definitions of environments to which equipment is disposed [SAND-79-2130] N81-14506
ENZYMOLOGY
Photochemistry and enzymology of photosynthesis [DOE/ER-03326/90] N81-14607
EPHEMERIDES
Photoheliographic results, 1972-1976 [ROG-13] N81-14941
EPIDEMIOLOGY
Misspecification of trend in spatial random function interpolation with application to oxidant mapping [DOE/EV-02874/59] N81-14517
EPITAXY
Medium power silicon transistors --- fabrication and assembling [BMFT-FB-T-79-160] N81-14237
EPOXY RESINS
A resin injection technique for the fabrication of aero engine composite components [PNR-90024] N81-14004
EQUATIONS OF MOTION
Stabilization of the numerical integration of equations of motion [DFVLR-FB-79-41] N81-14752
EQUATORIAL REGIONS
Internal tides and inertial oscillations as inferred from current and temperature measurements in the equatorial Pacific [PB80-225568] N81-14603
EQUIPMENT
DOE/DOD environmental data bank index --- numerical definitions of environments to which equipment is disposed [SAND-79-2130] N81-14506
EQUIPMENT SPECIFICATIONS
Specifications, tolerances, and other technical requirements for weighing and measuring devices. 1980 edition [PB80-213622] N81-14184
EQUIVALENT CIRCUITS
Symmetrical combiner analysis with S parameter matrices and equivalent circuits --- microwave power devices [AD-A091784] N81-14244
EROSION
Hot corrosion/erosion testing of materials for application to advanced power conversion systems using coal-derived fuels. Task 2: Fluidized bed combustion [FE-2452-39] N81-14071
High-temperature erosion-corrosion of alloys [EPRI-CS-1454] N81-14073
An experimental study of unipolar arcs in a low pressure mercury discharge [DOE/ET-51010/8] N81-14871
ERROR ANALYSIS
Handbook of satellite pointing errors and their statistical treatment [ESS/SS-997] N81-13985
Error sources applicable to precision trajectory radar calibration [AD-A091654] N81-14204
Some error probabilities for the association of passive DF measurements with radar returns [AD-A091659] N81-14206
The Eastern Pacific Tropical Cyclone Strike Probability Program (EPSTRKP) [AD-A091841] N81-14579
Design of fault-tolerant computers using ROM as basic building block [AD-A091715] N81-14635
Grid generation using differential systems techniques N81-14692
Nonlinear grid error effects on numerical solution of partial differential equations N81-14704
ERROR DETECTION CODES
Satellite Power System (SPS) antenna pointing control [NASA-CR-3350] N81-14392
A PASCAL processor validation suite [NPL-CSU-7/80] N81-14654
ERROR FUNCTIONS
On the expansion of confluent hypergeometric functions in terms of Bessel functions [MC-TW-192/79] N81-14737
ERROR SIGNALS
Improvements in the digitizing of analogue information [TDB-343] N81-14919
ESTIMATING
Global temperature patterns 6000 years ago [DOE/EV-100097/1] N81-14591
Biased regression: A ten year perspective [AD-A091551] N81-14770
Some simple examples of time series in M dimensions: An introduction [AD-A091733] N81-14772
Analysis of estimation errors in the identification of nonlinear systems [RR-115] N81-14776
ESTUARIES
An explicit model for two-dimensional tidal circulation using triangular finite elements: WAVETL user's manual [PB80-226046] N81-14604
ETCHING
Physical and chemical processes for the generation of 1 micron structures [BMFT-FB-T-79-51] N81-14023
Development and application of the electrochemical etching technique [DOE/EV-04814/T1] N81-14043
ETHYL ALCOHOL
Ethanol production for automotive fuel usage [DOE/ID-12050/3] N81-14123
Alcohol production from agricultural and forestry residues [DOE/EV-0108] N81-14125
EUCLIDEAN GEOMETRY
Numerical generation of two-dimensional orthogonal curvilinear coordinates in an Euclidean space N81-14726
EULER EQUATIONS OF MOTION
An objective method for determining the generalized transport tensor for two dimensional Eulerian models [AD-A091732] N81-14756
EUROPE
Seasat views North America, the Caribbean, and Western Europe with imaging radar [NASA-CR-163825] N81-14372
EVALUATION
Evaluation of a computer-generated perspective tunnel display for flight path following [NASA-TP-1736] N81-13958
Landing flying qualities evaluation criteria for augmented aircraft [NASA-CR-163097] N81-13969
Geothermal energy development in the eastern United States: Evaluation of potential geothermal resource areas [PB80-212806] N81-14386
Low cost bare-plate solar air collector [DOE/R5-10143/T1] N81-14465
Performance evaluation of a state-of-the-art solar air-heating system with auxiliary heat pump [DOE/CS-30122/4] N81-14490
An overview of the summer programming language [MC-IW-126/79] N81-14651
Evaluation and assessment of low noise preamplifiers for infrared detectors [CD.6500671] N81-14837
Cost and schedule control systems criteria for contract performance measurement: Implementation guide [DOE/CR-0015] N81-14917
EVAPORATION
Evaporation duct effects on maximum intercept range for 18-1 and 37.5-GHz emitters. A theoretical analysis of expected frequency distributions of intercept range for five oceanic areas [AD-A091724] N81-14205
EVAPORATION RATE
Solar ponds. Citations from the Engineering Index data base [PB80-814452] N81-14493
Meteorological factors affecting evaporation duct height climatologies [AD-A091665] N81-14583
EVAPORATIVE COOLING
Thermodynamic performance testing of the orbiter flash evaporator system N81-14143
Thermal protection of reentry vehicles by actively cooled nosetips N81-14165
EVEN-EVEN NUCLEI
Problem of phase transitions in nuclear structure [BNL-28357] N81-13998
EXCITATION
Energy transfer and quenching rates of laser-pumped electronically excited alkalis in flames [NASA-TM-82230] N81-14303
Nuclear excitations and reaction mechanisms [DOE/ER-03235/1] N81-14825
EXHAUST EMISSION
Support studies in fluidized-bed combustion [PB80-218613] N81-14056
NOx national emission inventory estimates [PB80-224058] N81-14522
Urban air pollution. Citations from the NTIS data base [PB80-814411] N81-14526
Ionospheric effects of rocket exhaust products (HEAO-C, Skylab and SPS-HLLV) [DOE/ER-0082] N81-14544
EXHAUST GASES
Reduction of exhaust smoke from gas-turbine engines by using fuel emulsions [AD-A091777] N81-13953
Organic compounds in the exhaust of a J85-5 turbine engine [AD-A091712] N81-13966
Proceedings of the workshop on Modification of the Upper Atmosphere by Satellite Power System (SPS) Propulsion Effluents [CONF-7906180] N81-14548
Exhaust noise in flight: The role of acoustic installation effects [PNR-90029] N81-14793
EXHAUST NOZZLES
An evaluation of wind tunnel test techniques for aircraft nozzle afterbody testing at transonic Mach numbers [AD-A091775] N81-13931
Evaluation of wind tunnel nozzle afterbody test techniques utilizing a modern twin engine fighter geometry at Mach numbers from 0.6 to 1.2 --- YF-17 aircraft [AD-A091545] N81-13932
EXOBIOLOGY
Aerospace Medicine and Biology: A continuing bibliography with indexes, supplement 212 [NASA-SP-7011(212)] N81-14611
EXOSPHERE
Ion-exosphere with anisotropic velocity distribution [AERONOMICA-ACTA-A-215-1980] N81-14527
EXPERIMENTAL DESIGN
Determination of soil properties from field observations of settlement [PB80-213226] N81-14181
Research on alkaline zinc secondary electrodes with emphasis on model [DOE/RL-90369/8] N81-14257
Plasma stabilization experiment --- trapping cold ions [DOE/ET-53087/2] N81-14876
Space plasma physics active experiments [NASA-CP-2165] N81-14944
Spacelab experiment: ALAE, Atmospheric Lyman-Alpha Emissions N81-14945
Atmospheric Emission Photometric Imaging on Spacelab (AEPI) N81-14946
Waves In Space Plasmas (WISP) [WISP-336] N81-14953
Magnetospheric multiprobes: Investigations and instrumentation N81-14955
EXPLOSIONS
Numerical study of explosive tearing mode instability in one-component plasmas [IPPJ-486] N81-14844

EXPLOSIVE DEVICES
On the improvement of miniature pyrotechnic devices for space application
[ESA-CR(P)-1296] N81-14105
Electrothermal response testing of electroexplosive devices with electrically conducting explosives
[SAND-80-0231] N81-14112
EXPLOSIVES
Electrothermal response testing of electroexplosive devices with electrically conducting explosives
[SAND-80-0231] N81-14112
Analysis of explosive composite RX-14-AE (HMX/polythylene/oleic acid)
[UCID-18785] N81-14132
EXPONENTIAL FUNCTIONS
Profit maximization models for exponential decay processes
[AD-A091522] N81-14768
EXPOSURE
DOE/DOD environmental data bank index --- numerical definitions of environments to which equipment is disposed
[SAND-79-2130] N81-14506
EXTERNAL STORES
Active flutter suppression on an F-4F aircraft with external stores using already existing control surfaces
[MBB-FE-17/S/PUB/24] N81-13972
Effects of nonlinearities on wing store flutter
[MBB-FE-17/S/PUB/27] N81-13974
EXTERNAL TANKS
Pyrotechnic shock at the orbiter/external tank forward attachment N81-14142

F

F REGION
ISIS topside sounder data gathered on Kwajalein Atoll during the summers of 1977 and 1978
[AD-A091845] N81-14539
Ionospheric effects of rocket exhaust products (HEAO-C, Skylab and SPS-HLLV)
[DOE/ER-0082] N81-14544
Proceedings of the workshop on Modification of the Upper Atmosphere by Satellite Power System (SPS) Propulsion Effluents
[CONF-7906180] N81-14548
F-4 AIRCRAFT
Application of vector performance optimization to a robust control loop design for a fighter aircraft
[DFVLR-FB-80-14] N81-13970
Active flutter suppression on an F-4F aircraft with external stores using already existing control surfaces
[MBB-FE-17/S/PUB/24] N81-13972
F-17 AIRCRAFT
Evaluation of wind tunnel nozzle afterbody test techniques utilizing a modern twin engine fighter geometry at Mach numbers from 0.6 to 1.2 --- YF-17 aircraft
[AD-A091545] N81-13932
Active control of an explosive wing-store flutter case
[MBB-FE-17/S/PUB/25] N81-13973
FABRICATION
Planar transistors and impatt diodes with ion implantation
[BMFT-FB-T-79-16] N81-14224
Medium power silicon transistors --- fabrication and assembling
[BMFT-FB-T-79-160] N81-14237
Development of sheet molding compound solar collectors with molded-in silvered glass reflective surfaces
[SAND-80-0702C] N81-14411
Thin film polycrystalline silicon solar cells
[DOE/ET-23047/4] N81-14420
Application of microfabrication technology to thermionic energy conversion
[DOE/ET-15423/4] N81-14431
FABRICS
Investigation of the minimum deployment time of a foam/fabric composite material
[AD-A091658] N81-14010
Application of foams to the processing of fabrics, phase 3
[DOE/CS-40056/T2] N81-14093
FACTOR ANALYSIS
An examination of the performance of two-stage group screening for use in computer simulation
[AD-A091553] N81-14668
FACULAE
Photoheliographic results, 1972-1976
[ROG-13] N81-14941
FAILURE ANALYSIS
Application of fracture mechanics in assuring against fatigue failure of ceramic components
[PB80-213549] N81-14095
Automation of a maintainability prediction
[AD-A091787] N81-14339
FAR FIELDS
Prediction of sound radiated from different practical jet engine inlets
[NASA-CR-163824] N81-14789
FAR ULTRAVIOLET RADIATION
Ultraviolet lasers. Citations from the International Aerospace Abstracts data base
[NASA-CR-163831] N81-14314
X-ray lasers. Citations from the International Aerospace Abstracts data base
[NASA-CR-163834] N81-14315
FAST NEUTRONS
Development and application of the electrochemical etching technique
[DOE/EV-04814/T1] N81-14043
Neutron radiation effects in fiber optics
[AD-A091661] N81-14838
FATIGUE (MATERIALS)
Constant-amplitude and flight-by-flight tests on CERP specimens
[MBB-FE-2/S/PUB-26] N81-14006
Influences of gaseous environment on low growth-rate fatigue crack propagation in steels
[DOE/ER-10389/1] N81-14066
The study and modeling of high temperature fatigue crack propagation in austenitic stainless steel
[DOE/ER-10475/T1] N81-14067
Application of fracture mechanics in assuring against fatigue failure of ceramic components
[PB80-213549] N81-14095
Comparisons of modified Vasco X-2 and AISI 9310 gear steels
[NASA-TP-1731] N81-14322
Fatigue properties of shuttle thermal protection system
[NASA-TM-81899] N81-14346
FATIGUE LIFE
Cryogenic aging of metals. Citations from the NTIS data base
[PB80-808868] N81-14075
Spectrum fatigue testing of simple test specimens containing artificial defects --- aluminum alloy 7075-T6 clad sheets with open holes
[FAA-TN-HU-2108] N81-14354
Torque ripple in a Darrieus, vertical axis wind turbine
[SAND-80-0475] N81-14417
FATIGUE TESTING MACHINES
Controls of aeronautical structures under fatigue testing by holographic pulsed lasers interferometry
[ISL-CO-218/79] N81-14300
Spectrum fatigue testing of simple test specimens containing artificial defects --- aluminum alloy 7075-T6 clad sheets with open holes
[FAA-TN-HU-2108] N81-14354
FATIGUE TESTS
Constant-amplitude and flight-by-flight tests on CERP specimens
[MBB-FE-2/S/PUB-26] N81-14006
The stress behavior of three advanced nickel base superalloys during high temperature low cycle fatigue
[AD-A091694] N81-14061
Fracture resistance of fatigue cracked welded details
[PB80-218217] N81-14336
FAULT TOLERANCE
Design of fault-tolerant computers using ROM as basic building block
[AD-A091715] N81-14635
FEASIBILITY ANALYSIS
Microwave landing systems. Citations from the Engineering Index data base
[PB80-814643] N81-13947
Microwave landing systems. Citations from the NTIS data base
[PB80-814635] N81-13948
Laser-Raman/Rayleigh flow diagnostic techniques applied to subsonic flow
[AD-A091695] N81-14275
Energy analysis of solar energy systems, heat pumps and of improved insulation of single family houses
[BMFT-FB-T-79-101] N81-14403
The RETE project. Integrated public and private cogeneration
[CISE-1527] N81-14406
Study of seed reprocessing systems for open cycle coal fired MHD power plants. Task 1: Selection of processes for more detailed study
[DOE/ET-15613/T1] N81-14435
Satellite Power System: Utility impact study
[EPRI-AP-1548] N81-14470
Geothermal energy development in the eastern Unites States geothermal space heating - Naval Air Rework Facility, Norfolk, Virginia
[PB80-217490] N81-14498
Geothermal energy development in the eastern United States. Geothermal space heating, Pittsville Middle/Elementary School, Pittsville, Maryland
[PB80-221088] N81-14499
Pressure harvesting of microalgae
[PB80-221781] N81-14609
Advanced automation for space missions: Technical summary
[NASA-CR-163827] N81-14914
FEDERAL BUDGETS
Department of Housing and Urban Development, and certain independent agencies appropriations, fiscal year 1981, part 2
[GPO-62-143] N81-14926
FEEDBACK CONTROL
Active flutter suppression on an F-4F aircraft with external stores using already existing control surfaces
[MBB-FE-17/S/PUB/24] N81-13972
A review of control theory for digital systems
[RR-120] N81-14685
FEMALES
Tables relating pure-tone audiometric threshold to age
[NPL-AC-94] N81-14616
FERMENTATION
Alcohol production from agricultural and forestry residues
[DOE/EV-0108] N81-14125
A multidisciplinary research program directed toward utilization of solar energy through bioconversion of renewable resources
[DOE/ER-00888/3] N81-14425
FERROMAGNETIC MATERIALS
Muon spin rotation research program
[NASA-CR-163829] N81-14801
FIBER COMPOSITES
An X-ray photoelectron spectroscopic examination of surfaces of some thermosetting resins and carbon fibre composites
[RAE-TM-MAT-347] N81-14007
Heatshield material selection for advanced ballistic reentry vehicles --- rayon fiber cloth impregnated with phenolic resin N81-14169
FIBER OPTICS
Precise RF timing signal distribution to remote stations --- fiber optics
[NASA-CASE-NPO-14749-1] N81-14186
Light communication systems. Citations from the NTIS data base
[PB80-815319] N81-14218
Experimental and analytical development of the application of a transit laser velocimeter
[AD-A091762] N81-14302
FIBER REINFORCED COMPOSITES
Effects of temperature, thermal exposure,and fatigue on an alumina/aluminum composite
[NASA-TP-1795] N81-14001
Literature research on the mechanical properties of fibre composite materials. Analysis of the state of the art, volume 1
[RAE-LIB-TRANS-2045] N81-14003
FIELD EFFECT TRANSISTORS
FETSIM user's manual and example --- D.C. and transient analysis of MOS circuits
[NASA-CR-150800] N81-14222
FIELD EMISSION
Field emission electric propulsion ion optics of slit emitters and beam focussing
[CLM/RR/E1/28] N81-14836

FIELD THEORY (PHYSICS)
Gauge theories and spontaneous symmetry breaking
[AD-A091800] N81-14804
FIGHTER AIRCRAFT
Computational aerodynamic design tools and techniques used at fighter development
[MBB-FE-122/S/PUB/13] N81-13950
Constant-amplitude and flight-by-flight tests on CERP specimens
[MBB-FE-2/S/PUB-26] N81-14006
FILE MAINTENANCE (COMPUTERS)
An overview of a minicomputer network
[SAND-80-0821] N81-14678
The flat-file alerter system
[AD-A091842] N81-14920
Requirements for an historical stratification file using STD and CTD data
[AD-A091864] N81-14921
Specifications for an STD/CTD system at the NODC
[AD-A091866] N81-14922
FILM THICKNESS
Production of optically thin free-standing oil films from the edge of a rotating disc --- liquid foils for ion accelerators
[DOE/ER-01388/457] N81-14840
FINANCE
Six kilowatt, residential photovoltaic power systems study; design, performance, economics, market potential
[UCID-18776] N81-14487
FINITE DIFFERENCE THEORY
A study of the sonic-boom characteristics of a blunt body at a Mach number of 6
[NASA-TP-1787] N81-13915
Numerical solutions of the Navier-Stokes equations for transonic afterbody flows
[NASA-TP-1784] N81-13919
The prediction of the flow and heat transfer in the vicinity of a jet in crossflow
[PNR-90025] N81-14271
Numerical methods in fluid flow problems. Citations from the NTIS data base
[PB80-814171] N81-14285
Numerical grid generation techniques --- conference
[NASA-CP-2166] N81-14690
Finite difference grid generation by multivariate blending function interpolation N81-14696
Generations of orthogonal surface coordinates N81-14700
An adaptive computation mesh for the solution of singular perturbation problems N81-14701
A new coordinate transformation for turbulent boundary layer flows N81-14702
Nonlinear grid error effects on numerical solution of partial differential equations N81-14704
A guide to the theory of gear's method for the numerical solution of systems of stiff ordinary differential equations
[NPL-DNACS-29/80] N81-14741
A random choice finite-difference scheme for hyperbolic conservation laws
[DOE/ER-03077/167] N81-14908
FINITE ELEMENT METHOD
Numerical methods in fluid flow problems. Citations from the NTIS data base
[PB80-814171] N81-14285
Stress intensity factors for cracks with circular and elliptic crack fronts, determined by 3D finite element methods --- corner, surface, and embedded cracks in cuboid blocks
[PNR-90035] N81-14349
Finite element analysis of time-dependent inelastic deformation in the presence of transient thermal stresses
[COO-2733-25] N81-14364
An explicit model for two-dimensional tidal circulation using triangular finite elements: WAVETL user's manual
[PB80-226046] N81-14604
Grid generation using differential systems techniques N81-14692
Grid generation using coarse, smooth finite elements N81-14705
Effect of grid system on finite element calculation N81-14715
Grid generation for two-dimensional finite element flowfield computation N81-14725
A note on C(O) Galerkin methods for two point boundary problems
[MC-NW-73/79] N81-14730
FIRE EXTINGUISHERS
Fire extinguishing apparatus having a slidable mass for a penetrator nozzle --- for penetrating aircraft and shuttle orbiter skin
[NASA-CASE-KSC-11064-1] N81-14137
FIRE PREVENTION
Aviation safety: Interior compartment materials
[GPO-50-388] N81-13933
Testimony of Elwood T. Driver, Vice Chairman, National Transportation Safety Board, accompanied by Gerrit J. Walhout, Chief, Human Factors Division, and Matthew M. McCormick, Senior Air Safety Investigator, Human Factors Division N81-13934
Testimony of a panel consisting of: Lloyd E. Frisbee, Vice President, Engineering and Operations, Lockheed California Company; Lyle A. Wright, Director, Powerplant Engineering, Douglas Aircraft Company, accompanied by Doctor H. C. Schjelderup, Chief Technology Engineer, Materials and Process Engineering, and F. E. Duskin, Senior Design Engineer, Interiors Engineering, Douglas Aircraft Company N81-13937
FISSION PRODUCTS
Long-term high-level waste technology program: Strategy document
[DOE/SR/WM-79/3-REV-4/80] N81-14829
FIXED POINT ARITHMETIC
Performance of the Gradient Adaptive Equalizer with Inherent Optimal Adjusting Step in Presence of Noise and Arithmetic Errors
[FUB-35-1979] N81-14240
FLAME PROPAGATION
Combustion mechanisms of solid propellants
[AD-A091857] N81-14108
FLAME RETARDANTS
Structural wood panels with improved fire resistance
[NASA-CASE-ARC-11174-1] N81-13999
FLAME SPECTROSCOPY
Possibilities and limitations of Raman spectroscopy in local temperature and concentration measurements in flames
[DFVLR-FB-80-17] N81-14030
Study of combustion and flame processes initiated by IR laser-induced absorption
[COO-4695-4] N81-14049
FLAMES
Some results on measurement of temperature and density in a flame by Raman spectroscopy N81-14019
FLASHING (VAPORIZING)
Effects of the Shuttle Orbiter fuselage and elevon on the molecular distribution of water vapor from the flash evaporator system N81-14155
FLAT PLATES
Finite element structural model of a large, thin, completely free, flat plate --- for large space structures
[NASA-TM-81887] N81-13992
Numerical analysis of planar, time-dependent inelastic deformation of plates with cracks by the boundary element method
[DOE/ER-02733/27] N81-14360
Boundary element analysis of time-dependent inelastic deformation of cracked plates loaded in anti-plane shear
[DOE/ER-02733/28] N81-14361
FLIGHT
STS-1 mission contamination evaluation approach N81-14154
FLIGHT CHARACTERISTICS
The collision course: Conditions, guidance laws and properties
[DFVLR-FB-80-06] N81-13942
FLIGHT CONDITIONS
The 1979 clear air turbulence flight test program N81-14569
Very short range forecasts of visibility and ceiling N81-14570
The microburst: Common factor in recent aircraft accidents N81-14571
Doctor Fujita's microburst analysis at Chicago N81-14572
Clear air turbulence forecasting techniques N81-14573
The program of the Techniques Development Laboratory in aviation weather forecasting N81-14574
FLIGHT CONTROL
Evaluation of a computer-generated perspective tunnel display for flight path following
[NASA-TP-1736] N81-13958
Landing flying qualities evaluation criteria for augmented aircraft
[NASA-CR-163097] N81-13969
FLIGHT FATIGUE
Crew stress and fatigue in the PAVE
[AD-A091668] N81-14620
FLIGHT HAZARDS
Aeronautical concerns and National Aeronautics and Space Administration atmospheric electricity projects N81-14567
FLIGHT PATHS
Midair and near midair collisions on two- and three-dimensional curvilinear flight paths
[DFVLR-FB-80-13] N81-13944
FLIGHT RULES
A literature study on visual motion accuity (minimum perceptible movement)
[DFVLR-MITT-80-06] N81-14618
FLIGHT SAFETY
Midair and near midair collisions on two- and three-dimensional curvilinear flight paths
[DFVLR-FB-80-13] N81-13944
Measuring weather for aviation safety in the 1980's N81-14568
FLIGHT SIMULATION
Evaluation of wind tunnel nozzle afterbody test techniques utilizing a modern twin engine fighter geometry at Mach numbers from 0.6 to 1.2 --- YF-17 aircraft
[AD-A091545] N81-13932
Development of a computer program data base of a navigation aid environment for simulated IFR flight and landing studies
[NASA-TM-80064] N81-13959
FLIGHT SIMULATORS
Equipment for testing and measuring a 'helmet mounted sight and display' system with a coupled movable television camera in the flight-simulator for research of the DFVLR
[DFVLR-MITT-80-04] N81-13960
Shuttle mission simulator N81-14148
FLIGHT STRESS
Crew stress and fatigue in the PAVE
[AD-A091668] N81-14620
FLIGHT STRESS (BIOLOGY)
Stress factors on pilot performance. Citations from the International Aerospace Abstracts data base
[NASA-CR-163836] N81-14623
FLIGHT TESTS
Flight test investigation of LORAN-C for en route navigation in the Gulf of Mexico
[AD-A091637] N81-13945
Active flutter suppression on an F-4F aircraft with external stores using already existing control surfaces
[MBB-FE-17/S/PUB/24] N81-13972
Constant-amplitude and flight-by-flight tests on CERP specimens
[MBB-FE-2/S/PUB-26] N81-14006
Thermal analysis of proposed W81 heatshield materials flown on a Malemute system
[SAND-79-2417] N81-14013
The 1979 clear air turbulence flight test program N81-14569
Assessment of ground effects on the propagation of aircraft noise: The T-38A flight experiment
[NASA-TP-1747] N81-14788
FLOOD PREDICTIONS
Three-Hour rainfall required for flash flooding on small streams
[PB80-225576] N81-14596
FLOODS
ARID zone geosystems
[AD-A091689] N81-14379
FLOW CHARACTERISTICS
Curvilinear grids for sinuous river channels N81-14724
FLOW DISTRIBUTION
Possibilities and limitations of Raman spectroscopy in local temperature and concentration measurements in flames
[DFVLR-FB-80-17] N81-14030

An axisymmetric, strong-interaction procedure to include large normal pressure gradients
[AD-A091820] N81-14274
Hot film anemometry. Citations from the NTIS data base
[PB80-814288] N81-14297
An investigation into grid patching techniques N81-14708
A three-dimensional body-fitted coordinate system for flow field calculations on asymmetric nosetips N81-14711
Grid generation for two-dimensional finite element flowfield computation N81-14725

FLOW EQUATIONS
An investigation into grid patching techniques N81-14708

FLOW GEOMETRY
Grid generation using classical techniques N81-14691
An electrostatic analog for generating cascade grids N81-14695
Finite difference grid generation by multivariate blending function interpolation N81-14696
Generations of orthogonal surface coordinates N81-14700
A new coordinate transformation for turbulent boundary layer flows N81-14702

FLOW MEASUREMENT
Tables of homogeneous equilibrium critical flow parameters for water in SI units
[EGG-2056] N81-14280
Evaluation of orifice meter recorder measurement errors in lower and upper capacity ranges
[DOE/BC-10025/13] N81-14295
Air/gas system dynamics of fossil fuel power plants. Volume 3: Experimental pressure test data of a 500 MW unit and of a 125 MW unit
[EPRI-CS-1444-VOL-3] N81-14478

FLOW VELOCITY
Analysis of unsteady pressure measurements on an aerofoil section with an harmonically oscillating, slotted flap
[DFVLR-FB-80-22] N81-13929

FLOWMETERS
Evaluation of orifice meter recorder measurement errors in lower and upper capacity ranges
[DOE/BC-10025/18] N81-14295

FLUES
Support studies in fluidized-bed combustion
[PB80-218613] N81-14056

FLUID DYNAMICS
A laser Doppler velocimeter for pulsatile water flow measurements in resonant hydraulic circuits
[CISE-1521] N81-14269
Hot film anemometry. Citations from the NTIS data base
[PB80-814288] N81-14297
An electrostatic analog for generating cascade grids N81-14695
A simple numerical orthogonal coordinate generator for fluid dynamic applications N81-14710

FLUID FLOW
Numerical solution of an advection-diffusion equation for a dissolved species in a pulsating crack
[NPL-DNACS-28/80] N81-14025
SOLA-VOF: A solution algorithm for transient fluid flow with multiple free boundaries
[LA-8355] N81-14281
Numerical methods in fluid flow problems. Citations from the NTIS data base
[PB80-814171] N81-14285
Numerical methods in fluid flow problems. Citations from the NTIS data base
[PB80-814189] N81-14286
Geothermal energy. Citations from the Engineering Index data base
[PB80-814684] N81-14496
Numerical grid generation techniques --- conference
[NASA-CP-2166] N81-14690

FLUID MECHANICS
An investigation of turbulent wall-pressure fluctuations in a pipe downstream of an abrupt enlargement of its cross-sectional area
[DFVLR-FB-80-11] N81-14273
Grid generation using classical techniques N81-14691
Grid and metric generation on the assembly of locally bi-quadratic coordinate transformations N81-14698

FLUIDIZED BED PROCESSORS
Development of a simple fluidized-bed coal combustion model for the assessment of a pressurized fluidized-bed combustion system for electrical power generation
[DOE/METC/SP-80/15] N81-14044
Support studies in fluidized-bed combustion
[PB80-218613] N81-14056
Hot corrosion/erosion testing of materials for application to advanced power conversion systems using coal-derived fuels. Task 2: Fluidized bed combustion
[FE-2452-39] N81-14071
High-temperature erosion-corrosion of alloys
[EPRI-CS-1454] N81-14073
Progress in wood gasification at the University of Missouri-Rolla
[CONF-800973-1] N81-14128
Measurements of microwave transmission characteristics through various configurations of fluidized bed materials
[DOE/MC-14143/T1] N81-14208

FLUORESCENCE
Impurity studies in fusion devices using laser-fluorescence-spectroscopy
[CONF-801037-17] N81-14048
Energy transfer and quenching rates of laser-pumped electronically excited alkalis in flames
[NASA-TM-82230] N81-14303
Laser excitation of fluorescence in the A-X system of NH
[NASA-TM-82231] N81-14304

FLUORIDES
Solid lubricants: Graphite, polymers, fluorides, and general studies. Citations from the Engineering Index data base
[PB80-815673] N81-14101

FLUOROPOLYMERS
Perfluoroalkyl polytriazines containing pendent iododifluoromethyl groups
[NASA-CASE-ARC-11241-1] N81-14016

FLUTTER
Passive control of wing/store flutter
[NASA-TM-81865] N81-13922
Active flutter suppression on an F-4F aircraft with external stores using already existing control surfaces
[MBB-FE-17/S/PUB/24] N81-13972
Active control of an explosive wing-store flutter case
[MBB-FE-17/S/PUB/25] N81-13973

FLUTTER ANALYSIS
Effects of nonlinearities on wing store flutter
[MBB-FE-17/S/PUB/27] N81-13974

FLUX (RATE)
New methods to detect particle velocity and mass flux in arc-heated ablation/erosion facilities N81-14166
Improvement of the sensitivity of millimeter wave radio telescopes by synchronous tracking
[REPT-S-108] N81-14935

FLUX DENSITY
Research, development and demonstration of nickel-zinc batteries for electric vehicle propulsion
[ANL/OEPM-79-11] N81-14480

FLY BY WIRE CONTROL
Research and development of control actuation systems for aircraft. Volume 2. The evaluation of a force sharing and an active on-line fly-by-wire actuation system
[AD-A091559] N81-13976

FLYWHEELS
Regenerative flywheel energy storage system. Volume 1: Executive summary
[UCRL-15290-VOL-1] N81-14484
Regenerative flywheel storage system, volume 2
[UCRL-15290-VOL-2] N81-14485
Regenerative flywheel energy storage system. Volume 3: Life cycle and cost-benefit analysis of a battery-flywheel electric car
[UCRL-15290-VOL-3] N81-14486

FOAMS
Investigation of the minimum deployment time of a foam/fabric composite material
[AD-A091658] N81-14010
Application of foams to the processing of fabrics, phase 3
[DOE/CS-40056/T2] N81-14093

FOCUSING
A grainless focusing screen for cameras, microscopes and other optical instruments
[TDB-347] N81-14834
Field emission electric propulsion ion optics of slit emitters and beam focussing
[CLM/RR/E1/28] N81-14836

FOILS (MATERIALS)
Partial interlaminar separation system for composites
[NASA-CASE-LAR-12065-1] N81-14000

FOKKER-PLANCK EQUATION
Tokamak currents driven by weak electrostatic waves
[DOE/ET-53036/18] N81-14880

FORCED VIBRATION
Chaotically transitional phenomena in the forced negative-resistance oscillator --- systems simulation
[IJJP-482] N81-14842

FORECASTING
Distributed data processing standards forecast
[PB80-216211] N81-14642
Some simple examples of time series in M dimensions: An introduction
[AD-A091733] N81-14772

FOREST FIRE DETECTION
An automatic lightning detection system in northern California
[PB80-225592] N81-14597

FORESTS
Life from a plantary perspective: Fundamental issues in global ecology N81-14503

FORGING
The development of fluorides for high power laser optics
[DOE/DP-40020/1] N81-14839

FORMAT
The effects of symbology and spatial arrangement on the comprehension of software specifications
[AD-A091614] N81-14669

FORMATIONS
Carolina Geological Society field trip guidebook, 11-12 October 1980. Geological investigations of Piedmont and triassic rocks, central North Carolina and Virginia (with a field trip guide on the bedrock geology of south central Virginia)
[DOE/SR-00001/T2] N81-14547

FORMING TECHNIQUES
Hot flow turning T-A6V titanium alloy
[PUR-90028] N81-14174

FORTRAN
Modifications to the Hess three-dimensional lifting body code to convert from CDC FORTRAN to IBM FORTRAN with reductions in core requirements and execution times N81-14647
Optimal control nonlinear programming, spline interpolation, numerical software
[DFVLR-MITT-80-03] N81-14681

FOSSIL FUELS
Technology characterizations: Environmental information handbook
[DOE/EV-0072] N81-14426
Global energy futures and the carbon dioxide problem N81-14502

FOSSILS
Global temperature patterns 6000 years ago
[DOE/EV-100097/1] N81-14591

FOURIER ANALYSIS
Long term variability of windspeed
[AD-A091802] N81-14581

FOURIER TRANSFORMATION
Role of the sectionalized Fourier Transform in high-speed coherence processing
[AD-A091419] N81-14636
Applications of the Fast Fourier Transform. Citations from the NTIS data base
[PB80-815491] N81-14677
Analysis method of the spatio-temporal structure of an acoustic field in the air with the aid of its optical Fourier transform
[ISL-CO-219/79] N81-14787

FRACTIONATION
Development and optimization of methodologies for analysis of complex hydrocarbon mixtures
[DOE/ER-10554-T1] N81-14114

FRACTOGRAPHY
Influence of environment on constant load and fatigue crack propagation of titanium alloys Ti-6Al-4V and Ti-8Al-1Mo-1V
[DFVLR-FB-80-08] N81-14059

FRACTURE MECHANICS
Strength and fracture characteristics of HTGR thermal barrier ceramics
[GA-A-15929] N81-14094
Application of fracture mechanics in assuring against fatigue failure of ceramic components
[PB80-213549] N81-14095
J-integral elastic plastic fracture mechanics evaluation of the stability of cracks in nuclear reactor pressure vessels
[SAND-80-0688] N81-14357
FRACTURE STRENGTH
Mechanical characterization of Si3N4 N81-14005
Influence of environment on constant load and fatigue crack propagation of titanium alloys Ti-6Al-4V and Ti-8Al-1Mo-1V
[DFVLR-FB-80-08] N81-14059
Fracture resistance of fatigue cracked welded details
[PB80-218217] N81-14336
On the feasibility of quantitative ultrasonic determination of fracture toughness: A literature review
[NASA-CR-3356] N81-14337
FRACTURES (MATERIALS)
Statistical evaluation of J sub c in a 533-B weld metal and heat affected zone
[TRITA-HFL-0026] N81-14323
FRACTURING
Fatigue threshold level in steel
[TRITA-HFL-0024] N81-14350
FREDHOLM EQUATIONS
Multiple grid methods for the solution of Fredholm integral equations of the second kind
[MC-NW-75/79] N81-14732
FREE BOUNDARIES
SOLA-VOF: A solution algorithm for transient fluid flow with multiple free boundaries
[LA-8355] N81-14281
FREE ENERGY
Effects of several trace contaminants on fuel cell performance
[DOE/METC/RI-80/16] N81-14455
FREE FLOW
Free-stream disturbances, continuous eigenfunctions, boundary-layer instability and transition
[NASA-CR-163828] N81-14266
FREQUENCIES
Experimental modeling of laminar composites for multifrequency eddy current measurements
[BDX-613-2482] N81-14014
FREQUENCY DISTRIBUTION
Statistics of wind fluctuations over complex terrain
[DOE/ET-20560/1] N81-14593
FREQUENCY MODULATION
Use of amplitude compandored SSB in the mobile radio bands
[PB80-215791] N81-14212
Spectral efficiency of FM and ACSB radios
[PB80-215767] N81-14215
Rhyme test performance of ACSB (amplitude compandored single sideband), narrow band, and FM radios
[PB80-215932] N81-14217
FREQUENCY RANGES
Dye lasers. Citations from the NTIS data base
[PB80-813801] N81-14312
Non-axisymmetric (m = plus or minus 1) Alfven waves in a cylindrical plasma
[IPF-80-1] N81-14851
FREQUENCY STABILITY
Digital data reduction algorithm for oscillatory signals with an application to L-instability
[VTH-LR-298] N81-14194
FREQUENCY STANDARDS
Precise RF timing signal distribution to remote stations --- fiber optics
[NASA-CASE-NPO-14749-1] *N81-14186*
FRICTION
Effects of nonlinearities on wing store flutter
[MBB-FE-17/S/PUB/27] *N81-13974*
Changes in surface chemistry of silicon carbide (0001) surface with temperature and their effect on friction
[NASA-TP-1756] N81-14079
The control of microbial contamination of cutting fluid ZX-1
[MQAD-TP-727] N81-14338
FRONTS (METEOROLOGY)
Coastal zone wind energy. Part 1: Synoptic and mesoscale controls and distributions of coastal wind energy
[DOE/ET-20274/7-PT-1] N81-14434
FUEL CELLS
An experimental study of methanol reformation
[AD-A091412] N81-14111
Catalyst and process development for hygrogen preparation from future fuel cell feedstocks
[DOE/ET-15383-22] N81-14430
Development of molten carbonate fuel cell power plant technology
[DOE/ET-15440/2] N81-14432
Development of molten carbonate fuel cell power plant
[DOE/ET-17019/1] N81-14436
Effects of several trace contaminants on fuel cell performance
[DOE/METC/RI-80/16] N81-14455
FUEL COMBUSTION
Fundamental characterization of alternate fuel effects in continuous combustion systems
[DOE/ET-11313/T1] N81-14042
FUEL CONSUMPTION
Technological forecasting--aircraft design. Citations from the International Aerospace data base
[PB80-815970] N81-13957
The future of civil turbo-fan engines
[PNR-90034] N81-13964
Regenerative engine analysis
[AD-A091755] N81-13965
Alternate fuels for industrial combustion engines. Report on task 018
[FE-2468-77] N81-14130
FUEL GAGES
Acoustic fuel quantity measurement system. Signal conditioning unit
[AD-A091758] N81-13961
FUEL INJECTION
Ultra-lean combustion at high inlet temperatures
[NASA-TM-81640] N81-14398
FUEL OILS
Recycled program: Phase 1-Test procedures for recycled oil used as burned fuel
[PB80-215536] N81-14133
FUEL PRODUCTION
Ethanol production for automotive fuel usage
[DOE/ID-12050/3] N81-14123
Crossed reaction networks in the catalytic hydrodenitrogenation of synthetic liquid fuels
[DOE/PC-30094/1] N81-14124
Solar ponds. Citations from the NTIS data base
[PB80-814460] N81-14494
FUELS
Atomic hydrogen storage method and apparatus
[NASA-CASE-LEW-12081-3] N81-14103
BICYCLE: A comptuer code for calculating levelized life-cycle costs
[LA-8493-MS] N81-14341
FUNCTIONAL ANALYSIS
Control of dynamical systems
[AD-A091704] N81-14686
Stability and bifurcation in a parabolic equation
[AD-A091645] N81-14753
FUNCTIONS (MATHEMATICS)
Dual methods and approximation concepts in structural synthesis
[NASA-CR-3226] N81-14347
Development of empirical potential functions for the study of molecular geometry and applications to chlorophyll a dimers
[DOE/ER-02837-T1] N81-14810
FURNACES
Support studies in fluidized-bed combustion
[PB80-218613] N81-14056
FUSELAGES
Effects of the Shuttle Orbiter fuselage and elevon on the molecular distribution of water vapor from the flash evaporator system N81-14155
FUSION REACTORS
Impurity studies in fusion devices using laser-fluorescence-spectroscopy
[CONF-801037-17] N81-14048
An experimental study of unipolar arcs in a low pressure mercury discharge
[DOE/ET-51010/8] N81-14871
Fusion reactor physics and technology
[DOE/ET-52048/T1] N81-14881

G

GALERKIN METHOD
A note on C(O) Galerkin methods for two point boundary problems
[MC-NW-73/79] N81-14730
GALLIUM ARSENIDE LASERS
Optical triggering of power thyristors
[BMFT-FB-T-79-168] N81-14238
Neutron and gamma radiation effects on GaAlAs laser diodes
[AD-A091795] N81-14305
GAME THEORY
Linear programming and undiscounted stochastic games in which one player controls transitions
[MC-BW-122/80] N81-14777
GAMMA FUNCTION
Some notes on the gamma function
[FOA-C-10160-M8] N81-14751
GAMMA RAYS
Neutron and gamma radiation effects on GaAlAs laser diodes
[AD-A091795] N81-14305
X-ray lasers. Citations from the International Aerospace Abstracts data base
[NASA-CR-163834] N81-14315
GAS ANALYSIS
Stark cell optoacoustic detection of constituent gases in sample
[NASA-CASE-NPO-14143-1] N81-14015
On-line Zeeman atomic absorption spectroscopy for mercury analysis in oil shale gases
[PB80-216922] N81-14055
GAS CHROMATOGRAPHY
Organic compounds in the exhaust of a J85-5 turbine engine
[AD-A091712] N81-13966
Development and optimization of methodologies for analysis of complex hydrocarbon mixtures
[DOE/ER-10554-T1] N81-14114
GAS COMPOSITION
Catalyst and process development for hydrogen preparation from future fuel cell feedstocks
[DOE/ET-15383/18] N81-14463
GAS COOLED REACTORS
Strength and fracture characteristics of HTGR thermal barrier ceramics
[GA-A-15929] N81-14094
Medium-size high temperature gas-cooled reactor
[GA-A-15863] N81-14833
GAS DETECTORS
Stark cell optoacoustic detection of constituent gases in sample
[NASA-CASE-NPO-14143-1] N81-14015
A survey of concepts/techniques for sensing oxygen in aircraft oxygen-generating systems
[AD-A091667] N81-14038
GAS DISCHARGES
Infrared emission spectroscopy of low pressure gaseous discharges, 3
[AD-A091744] N81-14540
GAS DYNAMICS
Phase-equilibria for design of coal gasification processes. Dew points of hot gases containing condensible tars
[DOE/ET-10603/T1] N81-14120
Numerical methods in fluid flow problems. Citations from the NTIS data base
[PB80-814189] N81-14286
Air/gas system dynamics of fossil fuel power plants. Volume 3: Experimental pressure test data of a 500 MW unit and of a 125 MW unit
[EPRI-CS-1444-VOL-3] N81-14478
GAS FLOW
Two phase flow studies
[DOE/ET-27225/13] N81-14278
Analysis method of the spatio-temporal structure of an acoustic field in the air with the aid of its optical Fourier transform
[ISL-CO-219/79] N81-14787
GAS INJECTION
Numerical simulation of density evolution in JIPP T-2 Tokamak
[IPPJ-483] N81-14841
GAS IONIZATION
High-energy positron ionization of adsorbed species in the impulse approximation
[AD-A091748] N81-14805

GAS LASERS
NPL-PTB intercomparison of iodine-stabilized ion lasers
[NPL-MOM-42] N81-14308

GAS MIXTURES
Phase-equilibria for design of coal gasification processes. Dew points of hot gases containing condensible tars
[DOE/ET-10603/T1] N81-14120

GAS TURBINE ENGINES
Power control for hot gas engines
[NASA-CASE-NPO-14220-1] N81-14318
Improved capabilities to detect incipient bearing failures
[AD-A091687] N81-14325
Compressor configuration and design optimization for the high reliability gas turbine
[DOE/ET-15425/T1] N81-14327
Gas turbine engines and transmissions for bus demonstration programs
[COO-4867-07] N81-14329
Applicability of advanced automotive heat engines to solar thermal power
[NASA-TM-81658] N81-14397
Ultra-lean combustion at high inlet temperatures
[NASA-TM-81640] N81-14398
The measurement of aero gas turbine noise
[PNR-90032] N81-14795

GAS TURBINES
Reduction of exhaust smoke from gas-turbine engines by using fuel emulsions
[AD-A091777] N81-13953
Some aspects of materials and structures engineering with ceramics for engine applications
[AD-A091547] N81-13967
Fundamental characterization of alternate fuel effects in continuous combustion systems
[DOE/ET-11313/T1] N81-14042
Hot corrosivity of coal gasification products on gas turbine alloys
[DOE/ET-13547/T1] N81-14070
Hot flow turning T-A6V titanium alloy
[PUR-90028] N81-14174
Effects of downstream distance on turbulence decay for the compressor research facility low conditioning system
[AD-A091543] N81-14276
Ceramic turbine components research and development. Part 2: Evaluation of MCrAlY/ZrO2 (Y2O3) thermal-barrier coatings exposed to simulated gas turbine environments
[EPRI-AP-1539-PT-2] N81-14331
Development of high-temperature turbine subsystem technology to a technology readiness status, phase 2
[FE-1806-72] N81-14332
Catalytic combustion of coal-derived liquids
[NASA-TM-81594] N81-14396
Proceedings of the Depeartment of Energy Advanced Gas Turbine Central Power Systems Workshop
[CONF-8004103] N81-14479

GAS-METAL INTERACTIONS
Computer simulations for the microscopic mechanism of hot gas erosion
[AD-A091859] N81-14060

GASES
The drift, diffusion, and reactions of slow ions in gases
[AD-A091683] N81-14034
Investigation of sulfur-tolerant catalysts for selective synthesis of hydrocarbon liquids from coal derived gases
[DOE/ET-14809/3] N81-14118
Chemical release module facility N81-14957

GASIFICATION
Progress in wood gasification at the University of Missouri-Rolla
[CONF-800973-1] N81-14128
Methane or methanol via catalytic gasification of biomass
[PNL-SA-8049] N81-14131

GASOHOL (FUEL)
Ethanol production for automotive fuel usage
[DOE/ID-12050/3] N81-14123

GATES (CIRCUITS)
Optical triggering of power thyristors
[BMFT-FB-T-79-168] N81-14238
Performance degradation of a 7400 TTL NAND gate due to sinusoidal interference
[AD-A091745] N81-14249

GAUSS EQUATION
Approximations to the cumulative distribution function of the magnitude-squared coherence estimate
[AD-A091539] N81-14767

GEARS
Solid lubricants: Graphite, polymers, fluorides, and general studies. Citations from the Engineering Index data base
[PB80-815673] N81-14101
Power control for hot gas engines
[NASA-CASE-NPO-14220-1] N81-14318
Comparisons of modified Vasco X-2 and AISI 9310 gear steels
[NASA-TP-1731] N81-14322

GENETICS
Nerve impulse propagation in a branching nerve system: A simple model
[MC-TW-203/80] N81-14617
Clines in a discrete time model in population genetics
[MC-TW-193/79] N81-14762

GEOCHEMISTRY
Comparative assessment of five potential sites for hydrothermal magma systems: Geochemistry --- The Geysers-Clear Lake region, Long Valley, Rio Grand Rift, Roosevelt Hot Springs, and the Salton Trough
[LBL-11410] N81-14471
Life from a plantary perspective: Fundamental issues in global ecology N81-14503

GEOCHRONOLOGY
Carolina Geological Society field trip guidebook, 11-12 October 1980. Geological investigations of Piedmont and triassic rocks, central North Carolina and Virginia (with a field trip guide on the bedrock geology of south central Virginia)
[DOE/SR-00001/T2] N81-14547

GEODESY
Estimation on the Wettzell coordinates from satellite laser ranging at Kootwijk, San Fernando and Wettzell
[VTH-LR-296] N81-14373

GEODETIC COORDINATES
Estimation on the Wettzell coordinates from satellite laser ranging at Kootwijk, San Fernando and Wettzell
[VTH-LR-296] N81-14373

GEOLOGICAL FAULTS
Interpretation of dipole-dipole electrical resistivity survey, Colado geothermal area, Pershing County, Nevada
[DOE/ID-12079/11] N81-14252

GEOLOGY
Geothermal energy development in the eastern United States: Evaluation of potential geothermal resource areas
[PB80-212806] N81-14386

GEOMETRY
Finite difference grid generation by multivariate blending function interpolation N81-14696
Fast Generation of body conforming grids for 3-D N81-14706
On the geometry of multivariable root-loci
[RR-118] N81-14748

GEOMORPHOLOGY
Basaltic volcanism contribution N81-14369

GEOPHYSICAL FLUIDS
Two phase flow studies
[DOE/ET-27225/13] N81-14278

GEOPHYSICS
Earth resources
[FOA-C-10148-M3] N81-14375
Applications of time series analysis to geophysical data
[PB80-213978] N81-14551
Tether facility presentation N81-14958

GEOSTROPHIC WIND
A computer program for determining and displaying the geostrophic winds on Lakes Superior and Michigan
[PB80-225675] N81-14599

GEOTHERMAL ENERGY CONVERSION
Industrial application of geothermal energy in southeast Idaho
[DOE/ID-12010/4] N81-14454
Residential heating costs: A comparison of geothermal solar and conventional resources
[PNL-3200] N81-14464

GEOTHERMAL ENERGY EXTRACTION
Geothermal energy. Citations from the Engineering Index data base
[PB80-814684] N81-14496

GEOTHERMAL ENERGY UTILIZATION
Geothermal energy development in the eastern Unites States geothermal space heating - Naval Air Rework Facility, Norfolk, Virginia
[PB80-217490] N81-14498
Geothermal energy development in the eastern United States. Geothermal space heating, Pittsville Middle/Elementary School, Pittsville, Maryland
[PB80-221088] N81-14499

GEOTHERMAL RESOURCES
Interpretation of dipole-dipole electrical resistivity survey, Colado geothermal area, Pershing County, Nevada
[DOE/ID-12079/11] N81-14252
Geothermal energy development in the eastern United States: Evaluation of potential geothermal resource areas
[PB80-212806] N81-14386
Geothermal energy: Technology and general studies. Citations from the NTIS data base
[PB80-814676] N81-14497

GEOTHERMAL TECHNOLOGY
Two phase flow studies
[DOE/ET-27225/13] N81-14278
Geothermal energy. Citations from the Engineering Index data base
[PB80-814692] N81-14495
Geothermal energy. Citations from the Engineering Index data base
[PB80-814684] N81-14496

GERMANY
Development of technical integrated circuits
[BMFT-FB-T-79-41] N81-14228
Documentation of and information on protective rights relating to government support on 'technological research and development
[BMFT-FB-T-79-186] N81-14918

GLASS
Electrochromic glasses
[AD-A091641] N81-14088
Development of sheet molding compound solar collectors with molded-in silvered glass reflective surfaces
[SAND-80-0702C] N81-14411

GLASS FIBER REINFORCED PLASTICS
The compression moulding of composite aero engine components with elevated thermal stability
[PNR-90036] N81-13962
Design and fabrication of terrestrial, photovoltaic solar generators for field testing in regions of intensive insolation
[BMFT-FB-T-79-34] N81-14400

GLASS FIBERS
Vanadium trineodecanoate promoter for fiberglass-polyester soil surfacings
[AD-A091785] N81-14084

GLOBAL AIR POLLUTION
Mitigating strategies for CO2 problems
[DOE/EV-10281/T2] N81-14511

GOLD
Advanced ion implantation techniques
[BMFT-FB-T-79-37] N81-14897

GOVERNMENT PROCUREMENT
Standard spacecraft procurement analysis: A case study in NASA-DoD coordination in space programs
[R-2619-RC] N81-14915

GOVERNMENT/INDUSTRY RELATIONS
An assessment of General Aviation utilization of advanced avionics technology
[NASA-CR-159328] N81-13941
Energy information referral directory, second quarter 1980
[DOE/EIA-0205/80-2Q] N81-14424
Assessment of industrial activity in the utilization of biomass for energy
[DOE/PE-70090/01] N81-14457
Cost and schedule control systems criteria for contract performance measurement: Implementation guide
[DOE/CR-0015] N81-14917

GOVERNMENTS
Energy policy study. Volume 10: Nuclear power regulation
[DOE/EIA-0201/10] N81-14423
Documentation of and information on protective rights relating to government support on 'technological research and development
[BMFT-FB-T-79-186] N81-14918

GRAFTING
Radiation-induced crosslinking and grafting reactions in polyethylene
[DOE/ER-02845/T1] N81-14090

GRAIN BOUNDARIES
Thin film polycrystalline silicon solar cells
[DOE/ET-23047/4] N81-14420
Photovoltaic mechnisms in polycrystalline thin-films silicon solar cells
[DOE/ET-23108/5] N81-14440
Photovoltaic mechanisms in polycrystalline thin film solar cells
[DOE/ET-23106/2] N81-14441
Characterization of extrinsic grain boundary dislocations and grain boundary dislocation sources by transmission electron microscopy
[DOE/AL-10887] N81-14902
Mechanism for diffusion induced grain boundary migration
[DOE/ER-05002/13] N81-14904
Kinetic processes at grain boundaries
[DOE/ER-05002/11] N81-14905

GRAMMARS
Time and space complexity of inside-out macro languages
[MC-IW-141/80] N81-14658

GRAPHITE
Electronic and optical properties and modeling of intercalated graphite
[AD-A091858] N81-14009
Solid lubricants. Citations from the American Petroleum Institute data base
[PB80-816010] N81-14099
Solid lubricants. Citations from the NTIS data base
[PB80-815665] N81-14100
Solid lubricants: Graphite, polymers, fluorides, and general studies. Citations from the Engineering Index data base
[PB80-815673] N81-14101
Atomic hydrogen storage method and apparatus
[NASA-CASE-LEW-12081-3] N81-14103

GRAPHITE-EPOXY COMPOSITE MATERIALS
Partial interlaminar separation system for composites
[NASA-CASE-LAR-12065-1] N81-14000

GRAVITATION
Prospects for supergravity
[FERMILAB-CONF-80/74-THY] N81-14549

GRAVITATION THEORY
Prospects for supergravity
[FERMILAB-CONF-80/74-THY] N81-14549

GRAVITATIONAL EFFECTS
Fragmentation in rotating isothermal protostellar clouds
[NASA-TM-82229] N81-14938

GRAVITY WAVES
Waves In Space Plasmas (WISP)
[WISP-336] N81-14953

GREASES
High temperature lubricants and oils. Citations from the Engineering Index data base
[PB80-815590] N81-14096
High temperature lubricants and oils. Citations from the NTIS data base
[PB80-815582] N81-14097
High temperature lubricants and oils. Citations from the Engineering Index data base
[PB80-815574] N81-14098

GREAT CIRCLES
Determination of the primary specular point in the sunglint pattern of a polar-orbiting satellite image
[AD-A091664] N81-13989

GREAT LAKES (NORTH AMERICA)
Computerized bathymetry and shorelines of the Great Lakes
[PB80-218308] N81-14387

GREENHOUSE EFFECT
Mitigating strategies for CO2 problems
[DOE/EV-10281/T2] N81-14511

GREENLAND
Occurrences of the polar slant E condition (SEC) at Marssarssuaq, Godhavn, Thule, 1978
[ISBN-87-7478-165-0] N81-14537

GRIDS
Grid generation using coarse, smooth finite elements N81-14705
Fast Generation of body conforming grids for 3-D N81-14706
Three dimensional spline-generated coordinate transformations for grids around wing-body configurations N81-14707
An investigation into grid patching techniques N81-14708
Effect of grid system on finite element calculation N81-14715
Some aspects of adapting computational mesh to complex flow domains and structures with application to blown shock layer and base flow N81-14716

GRINDING MACHINES
Technology of machine tools, volume 1. Executive summary
[UCRL-52960-1] N81-14333
Technology of machine tools. Volume 4: Machine tool controls
[UCRL-52960-4] N81-14334

GROUND EFFECT
Assessment of ground effects on the propagation of aircraft noise: The T-38A flight experiment
[NASA-TP-1747] N81-14788

GROUND SUPPORT EQUIPMENT
Icing instrumentation N81-14559
Observing lightning from ground-based and airborne stations N81-14566

GROUND TESTS
Shuttle remote manipulator system hardware test facility N81-14146

GROUND WIND
Coastal zone wind energy. Part 1: Synoptic and mesoscale controls and distributions of coastal wind energy
[DOE/ET-20274/7-PT-1] N81-14434
Site insolation and wind power characteristics: Technical report Midwest region
[DOE/CS-20160-01-VOL-4] N81-14586
Site insolation and wind power characteristics: Technical report Western region (south section)
[DOE/CS-20160-01-VOL-6] N81-14587
Site insolation and wind power characteristics: Technical report Western region (north section)
[DOE/CS-20160/01-VOL-5] N81-14588

GROUP DYNAMICS
Conceptual framework for describing selected urban and community impacts of federal energy policies
[PNL-3492] N81-14929

GUIDANCE (MOTION)
Extension of proportional navigation by use of optimal filtering and control methods
[DFVLR-FB-80-10] N81-13943

GUIDANCE SENSORS
Low-speed wind-tunnel tests of two weathercocking sensors
[WSRL-0171-TM] N81-14575

GULFS
The ability of passive microwave systems to detect sea ice --- Gulf of Bothnia, Baltic Sea
[REPT-S-113] N81-14374

GUN PROPELLANTS
Convective ignition of propellant cylinders in a developing cross-flow field
[AD-A091852] N81-14107

GUST LOADS
A general calculation method for the dynamic response to discrete gust distributions as exemplified by the rotorblade of a wind energy converter
[DFVLR-FB-80-12] N81-14408
Aviation meteorology research and development: A status report N81-14557

GUSTS
Security assessment of power systems
[DOE/ET-29100/11] N81-14447
Clear air turbulence: Historical comments N81-14562

GYROMAGNETISM
Realization of the ampere, and measurement of the gyromagnetic ratio of the proton
[NPL-DES-59] N81-14803

H

HALF SPACES
Elastodynamic analysis of an edge-crack normal to the free surface of a half-space N81-14342
Graphs of the three-dimensional state of stress at the vertex of a quarter-infinite crack in a half-space
[NTHD-123] N81-14351

HALL EFFECT
Investigations and developments on a Hall-Ion-Thruster
[DFVLR-FB-80-09] N81-13994

HAMILTONIAN FUNCTIONS
Separability of center of mass and relative motion of hydrogen in very strong magnetic fields
[DOE/ER-01545/284] N81-14907

HANDBOOKS
Technology characterizations: Environmental information handbook
[DOE/EV-0072] N81-14426

HANKEL FUNCTIONS
Rapid calculation of sin(x)
[FOA-C-10150-M8] N81-14749

HARDNESS
Study to optimize Cr-Mo steels to resist hydrogen and temper embrittlement
[DOE/ET-13513/T1] N81-14068

HARDNESS TESTS
Comparisons of modified Vasco X-2 and AISI 9310 gear steels
[NASA-TP-1731] N81-14322

HARMONIC ANALYSIS
Unsteady pressure distribution measurement on a rotating ellipsoid
[DFVLR-FB-80-18] N81-13927
Minimum distance estimation and components of goodness of fit statistics
[AD-A091514] N81-14769

HASTELLOY (TRADEMARK)
Air oxidation and seawater corrosion Hastelloy S and Hastelloy C-4 --- storage capsules for radioisotope heat source fuel
[PNL-3344] N81-14072

HAULING
Overview of the environmental concerns of coal transportation
[ANL/EES/TM-99] N81-14515

HEARING
Tables relating pure-tone audiometric threshold to age
[NPL-AC-94] N81-14616

HEAT EXCHANGERS
Hot corrosion/erosion testing of materials for application to advanced power conversion systems using coal-derived fuels. Task 2: Fluidized bed combustion
[FE-2452-39] N81-14071
Improved ceramic heat exchanger materials
[NASA-CR-159678] N81-14082
Ceramic heat pipe development
[DOE/TIC-11293] N81-14279
Solar central receiver hybrid power system, phase 1. Volume 3: Appendices
[DOE/ET-21038/1-VOL-3] N81-14418
High temperature heat exchange: Nuclear process heat applications
[GA-A-16052] N81-14832

HEAT FLUX
Studies of convective heat transfer coefficient enhancement in two-phase, non-boiling flow N81-14263

HEAT GENERATION
District heating/cogeneration application studies for Minneapolis-St. Paul area. Modifications of the existing units at the High Bridge Power Plant to cogeneration for hot water district heating
[ORNL/TM-6830/P9] N81-14474

HEAT MEASUREMENT
Enthalpy measurement of coal-derived liquids
[DOE/ET-13395/3-4] N81-14119

HEAT PUMPS
Ice-maker heat pump development
[ORNL/CON-50] N81-14282
Development and demonstration of a Stirling/Rankine heat activated heat pump
[DOE/CS-20043/T1] N81-14283
Energy analysis of solar energy systems, heat pumps and of improved insulation of single family houses
[BMFT-FB-T-79-101] N81-14403

Solar photovoltaic/thermal residential experiment, phase 1
[DOE/ET-20279/103] N81-14437
An energy and cost analysis of residential heat pumps in northern climates
[DOE/TIC-11275] N81-14462
Two well storage systems for combined heating and airconditioning by groundwater heatpumps in shallow aquifers
[LBL-11302] N81-14472
Performance evaluation of a state-of-the-art solar air-heating system with auxiliary heat pump
[DOE/CS-30122/4] N81-14490

HEAT RESISTANT ALLOYS
The stress behavior of three advanced nickel base superalloys during high temperature low cycle fatigue
[AD-A091694] N81-14061

HEAT SHIELDING
Thermal analysis of proposed W81 heatshield materials flown on a Malemute system
[SAND-79-2417] N81-14013
Heatshield material selection for advanced ballistic reentry vehicles --- rayon fiber cloth impregnated with phenolic resin N81-14169
Installing fiber insulation
[NASA-CASE-MSC-16973-1] N81-14317

HEAT SOURCES
Air oxidation and seawater corrosion Hastelloy S and Hastelloy C-4 --- storage capsules for radioisotope heat source fuel
[PNL-3344] N81-14072
A quick accurate method for calculating temperatures arising from rectangular and circular microcircuit heat sources
[AWRE-O-30/80] N81-14241
Analytic solutions for thermal conduction from heat producing cylinders and spheres
[SAND-80-0039] N81-14277

HEAT STORAGE
Developing and upgrading of solar system thermal energy storage simulation models
[DOE/CS-34482/4] N81-14422
Synthesis of research and development in mechanical energy storage technologies
[DOE/ET-16106/T1] N81-14439
Two well storage systems for combined heating and airconditioning by groundwater heatpumps in shallow aquifers
[LBL-11302] N81-14472
Ammonia as a hydrogen energy-storage medium
[BNL-28293] N81-14477
Geothermal energy development in the eastern Unites States geothermal space heating - Naval Air Rework Facility, Norfolk, Virginia
[PB80-217490] N81-14498

HEAT TRANSFER
Heat-transfer tests on a full and 1/4 scale aim-9E sidewinder missile and a 1/15 scale GBU-8 guided bomb unit at Mach numbers 1.5, 2.0 and 2.5
[AD-A091805] N81-13987
Derivation of the solid propellant response function
[VTH-M-366] N81-14104
The use of the principle of superposition in measuring and predicting the thermal characteristics of an electronic equipment operated in a space environment N81-14161
The prediction of the flow and heat transfer in the vicinity of a jet in crossflow
[PNR-90025] N81-14271
Numerical methods in fluid flow problems. Citations from the NTIS data base
[PB80-814189] N81-14286
Low cost cryostat
[NASA-CASE-NPO-14513-1] N81-14287
Annular solar receiver thermal characteristics
[SAND-79-1010] N81-14410
Advanced concepts test facility: Measurements and suggested test plan
[EPRI-CS-1530] N81-14466
A new tropopause definition from simultaneous ozone temperature profiles
[AD-A091718] N81-14543
Heat transfer modeling for a non-fluidized particulate bed
[EGG/ENI-143] N81-14910

HEAT TRANSFER COEFFICIENTS
Studies of convective heat transfer coefficient enhancement in two-phase, non-boiling flow N81-14263

HEAT TREATMENT
Characterizing and improving the toughness of thick-sectioned 21/4Cr-1Mo electrosiag weldments
[DOE/ET-12313/T1] N81-14344

HEATING
Plasma Physics of Intense Neutral Beam heating in Tokamaks
[CONF-790463-2] N81-14890

HEATING EQUIPMENT
BICYCLE: A comptuer code for calculating levelized life-cycle costs
[LA-8493-MS] N81-14341

HEAVY IONS
Thermodynamic interpretation of multiparticle emission in relativistic heavy ion collisions
[DOE/ER-03992/388] N81-14812
Heavy ion beam probing
[DOE/ET-53004/2] N81-14822
Investigation of nuclear structure and nuclear reactions induced by complex projectiles
[DOE/ER-04052/T1] N81-14826

HEAVY LIFT LAUNCH VEHICLES
Ionospheric effects of rocket exhaust products (HEAO-C, Skylab and SPS-HLLV)
[DOE/ER-0082] N81-14544

HEAVY NUCLEI
Nucleosynthesis of neutron-rich heavy nuclei during explosive helium burning in massive stars
[ATR-81(8454)-2] N81-14939

HEAVY WATER
Water-deuterium oxide exchange in polymers used in spacecraft applications --- outgassing from Mylar and Kapton N81-14159

HELICAL FLOW
Rotary balance data for a single-engine agricultural airplane configuration for an angle-of-attack range of 8 deg to 90 deg
[NASA-CR-3311] N81-13923

HELICOPTERS
The rating of helicopter noise: Development of a proposed impulse correction
[NPL-AC-93] N81-14792

HELIOSTATS
Solar central receiver in perspective
[SAND-79-2154C] N81-14414
Solar central receiver hybrid power system, phase 1. Volume 3: Appendices
[DOE/ET-21038/1-VOL-3] N81-14418

HELIUM
Nucleosynthesis of neutron-rich heavy nuclei during explosive helium burning in massive stars
[ATR-81(8454)-2] N81-14939

HELIUM PLASMA
Helium-jet coupled mass separator: Advances and directions
[CONF-800870-1] N81-14047

HELIUM-NEON LASERS
The Dalembertometer
[ISL-CO-220/79] N81-14292

HELMET MOUNTED DISPLAYS
Equipment for testing and measuring a 'helmet mounted sight and display' system with a coupled movable television camera in the flight-simulator for research of the DFVLR
[DFVLR-MITT-80-04] N81-13960

HELMHOLTZ VORTICITY EQUATION
A precise definition of separation of variables
[MC-TW-194/79] N81-14738

HEMOGLOBIN
Electron spin resonance of homozygous beta thalassemic plasma
[ISS-P-79/13] N81-14850

HEXAMETHYLENETETRAMINE
Structural wood panels with improved fire resistance
[NASA-CASE-ARC-11174-1] N81-13999

HF LASERS
Hydrogen fluoride and deuterium fluoride lasers. Citations from the International Aerospace Abstracts data base
[PB80-815871] N81-14313

HFB-320 AIRCRAFT
System identification of the longitudinal motion of the DFVLR HFB 320 research aircraft with particular consideration of control surface effectiveness
[DFVLR-MITT-79-16] N81-13971

HIERARCHIES
Hierarchial distribution modeling with routing costs
[MC-BW-117/80] N81-14780
Analytical evaluation of hierarchial planning systems
[MC-BW-118/80] N81-14781

HIGH CURRENT
Lead acid battery pulse discharge investigation
[DOE/CH-00128/1] N81-14427

HIGH ENERGY INTERACTIONS
High-energy positron ionization of adsorbed species in the impulse approximation
[AD-A091748] N81-14805

HIGH GRAVITY ENVIRONMENTS
Prospects for supergravity
[FERMILAB-CONF-80/74-THY] N81-14549

HIGH POWER LASERS
High power laser and materials investigation --- laser fusion
[DOE/DP-40054/1] N81-14307
Experimental studies of electron impact depopulation of excited states of atoms: Applications to laser development for fusion and isotope separation
[DOE/ES-04199/1] N81-14816

HIGH PRESSURE
A theory of droplet combustion at high pressures
[SAND-80-0081] N81-14040

HIGH RESOLUTION
Trace constituents in the middle atmosphere by high resolution UV spectroscopy N81-14947
Wide angle Michelson Doppler imaging interferometer --- measuring atmospheric emissions N81-14949

HIGH STRENGTH STEELS
Low alloy steels that minmize the hydrogen-carbide reaction, part 1
[DOE/ER-70296/T1] N81-14069

HIGH TEMPERATURE
High-temperature erosion-corrosion of alloys
[EPRI-CS-1454] N81-14073
Strength and fracture characteristics of HTGR thermal barrier ceramics
[GA-A-15929] N81-14094
Codification of the high-temperature propellant TRHA
[ESA-CR(P)-1374-VOL-1] N81-14106

HIGH TEMPERATURE ENVIRONMENTS
The study and modeling of high temperature fatigue crack propagation in austenitic stainless steel
[DOE/ER-10475/T1] N81-14067
Installing fiber insulation
[NASA-CASE-MSC-16973-1] N81-14317
High temperature heat exchange: Nuclear process heat applications
[GA-A-16052] N81-14832

HIGH TEMPERATURE GAS COOLED REACTORS
A camera device for the measurement of pin bowing in AGR fuel elements
[TDB-350] N81-14291

HIGH TEMPERATURE GASES
Computer simulations for the microscopic mechanism of hot gas erosion
[AD-A091859] N81-14060
Hot corrosivity of coal gasification products on gas turbine alloys
[DOE/ET-13547/T1] N81-14070
Development of high-temperature turbine subsystem technology to a technology readiness status, phase 2
[FE-1806-72] N81-14332

HIGH TEMPERATURE LUBRICANTS
High temperature lubricants and oils. Citations from the Engineering Index data base
[PB80-815590] N81-14096
High temperature lubricants and oils. Citations from the NTIS data base
[PB80-815582] N81-14097
High temperature lubricants and oils. Citations from the Engineering Index data base
[PB80-815574] N81-14098

HIGH TEMPERATURE PLASMAS
Confinement and heating of plasmas
[ISSN-0547-1567] N81-14848

HIGH TEMPERATURE TESTS
The stress behavior of three advanced nickel base superalloys during high temperature low cycle fatigue
[AD-A091694] N81-14061

HIGH VOLTAGES
Semiconductor crosspoints for direct replacement of electromechanical switches with high voltage requirements
[BMFT-FB-T-79-44] N81-14229

Development of a HVDC prototype breaker
[DOE/ET-29054/1] N81-14251
Study of electric field and ion effects on HVDC lines
[DOE/RA-50153/1] N81-14253
Passivation of silicon power devices by thermal oxidation
[BMFT-FB-T-79-48] N81-14401

HIGHWAYS
Overview of the environmental concerns of coal transportation
[ANL/EES/TM-99] N81-14515

HISTOGRAMS
Catalog of sea state and wind speed in the South Atlantic Bight
[NASA-CR-156872] N81-14601

HMX
Analysis of explosive composite RX-14-AE (HMX/polythylene/oleic acid)
[UCID-18785] N81-14132

HOLE DISTRIBUTION (MECHANICS)
A boundary element formulation for planar time-dependent inelastic deformation of plates with cutouts
[DOE/ER-02733/26] N81-14359

HOLOGRAPHIC INTERFEROMETRY
Controls of aeronautical structures under fatigue testing by holographic pulsed lasers interferometry
[ISL-CO-218/79] N81-14300

HOLOGRAPHY
A grainless focusing screen for cameras, microscopes and other optical instruments
[TDB-347] N81-14834

HOMING
The collision course: Conditions, guidance laws and properties
[DFVLR-FB-80-06] N81-13942
Extension of proportional navigation by use of optimal filtering and control methods
[DFVLR-FB-80-10] N81-13943

HORN ANTENNAS
Horn antenna design studies. Citations from the International Aerospace Abstract data base
[NASA-CR-163820] N81-14219

HOT CORROSION
Computer simulations for the microscopic mechanism of hot gas erosion
[AD-A091859] N81-14060
Hot corrosivity of coal gasification products on gas turbine alloys
[DOE/ET-13547/T1] N81-14070

HOT ELECTRONS
Model for ion confinement in a hot-electron tandem mirror anchor
[UCID-18802] N81-14894

HOT MACHINING
Hot flow turning T-A6V titanium alloy
[PUR-90028] N81-14174

HOT-FILM ANEMOMETERS
Hot film anemometry. Citations from the NTIS data base
[PB80-814288] N81-14297

HUMAN FACTORS ENGINEERING
Crew stress and fatigue in the PAVE
[AD-A091668] N81-14620
Human factors problems in general aviation
[AD-A091670] N81-14625

HUMIDITY
Proceedings of the workshop on Modification of the Upper Atmosphere by Satellite Power System (SPS) Propulsion Effluents
[CONF-7906180] N81-14548

HURRICANES
Annual data and verification tabulation Atlantic tropical cyclones 1979
[PB80-226301] N81-14598

HYBRID CIRCUITS
Basic concepts for integrated RC networks and hybrid circuits on organic substrate foils
[BMFT-FB-T-79-87] N81-14231
Manufacturing methods and technology program automatic in-process microcircuit evaluation
[AD-A091854] N81-14243

HYBRID STRUCTURES
Preconceptual design and assessment of a Tokamak hybrid reactor
[PNL-2720] N81-14883

HYDRAULIC EQUIPMENT
A laser Doppler velocimeter for pulsatile water flow measurements in resonant hydraulic circuits
[CISE-1521] N81-14269
An investigation of a digital electrohydraulic servovalve
[AD-A091563] N81-14326
Evaluation of advanced hydraulic turbomachinery for underground pumped hydroelectric storage. Part 1: Single-stage regulated pump turbines for operating heads of 500 to 1000 m
[ANL/ES-100-PT-1] N81-14328

HYDRAZINES
Prototype chemiluminescent analyzer for measurement of hydrazines
[AD-A091678] N81-14032
Test and evaluation of an Energetics Science Incorporated Model 7660 electrochemical hydrazines analyzer
[AD-A091710] N81-14035

HYDROCARBON FUELS
Fundamental characterization of alternate fuel effects in continuous combustion systems
[DOE/ET-11313/T1] N81-14042
An experimental study of methanol reformation
[AD-A091412] N81-14111
Investigation of sulfur-tolerant catalysts for selective synthesis of hydrocarbon liquids from coal derived gases
[DOE/ET-14809/3] N81-14118
Liquid fuels production from biomass
[DOE/ET-200550/T1] N81-14121
Effect of fuel nitrogen and hydrogen content on emissions in hydrocarbon combustion
[NASA-TM-81612] N81-14399

HYDROCARBONS
Chemical kinetic models for combustion of hydrocarbons and formation of nitric oxide
[NASA-TP-1794] N81-14017
Development and optimization of methodologies for analysis of complex hydrocarbon mixtures
[DOE/ER-10554-T1] N81-14114
Catalyst and process development for hydrogen preparation from future fuel cell feedstocks
[DOE/ET-15383/18] N81-14463
Direct detection of hydrocarbons using seismic procedures
[BMFT-FB-T-79-31] N81-14534

HYDROCLIMATOLOGY
Meteorological factors affecting evaporation duct height climatologies
[AD-A091665] N81-14583

HYDRODYNAMICS
Numerical methods in fluid flow problems. Citations from the NTIS data base
[PB80-814189] N81-14286
Fragmentation in rotating isothermal protostellar clouds
[NASA-TM-82229] N81-14938
Effect of stellar structure on supernova remnant evolution
[LA-UR-80-2756] N81-14940

HYDROELECTRICITY
Evaluation of advanced hydraulic turbomachinery for underground pumped hydroelectric storage. Part 1: Single-stage regulated pump turbines for operating heads of 500 to 1000 m
[ANL/ES-100-PT-1] N81-14328

HYDROFORMING
Hydroforming process for pressings
[PNR-90026] N81-14172

HYDROGEN
Low alloy steels that minmize the hydrogen-carbide reaction, part 1
[DOE/ER-70296/T1] N81-14069
Photoproduction of hydrogen by membranes of green photosynthetic bacteria
[BNL-28334] N81-14129
Diffractive photon dissociation on hydrogen (Fermilab Experiment 612)
[DOE/ER-02232/87] N81-14808
Separability of center of mass and relative motion of hydrogen in very strong magnetic fields
[DOE/ER-01545/284] N81-14907

HYDROGEN ATOMS
Atomic hydrogen storage method and apparatus
[NASA-CASE-LEW-12081-3] N81-14103
Cross sections for charge transfer collisions involving hydrogen atoms --- fusion plasmas
[IPPJ-AM-15] N81-14847

HYDROGEN BONDS
Enthalpy measurement of coal-derived liquids
[DOE/ET-13395/3-4] N81-14119

HYDROGEN EMBRITTLEMENT
Influences of gaseous environment on low growth-rate fatigue crack propagation in steels
[DOE/ER-10389/1] N81-14066
Study to optimize Cr-Mo steels to resist hydrogen and temper embrittlement
[DOE/ET-13513/T1] N81-14068

HYDROGEN FUELS
Catalyst and process development for hygrogen preparation from future fuel cell feedstocks
[DOE/ET-15383-22] N81-14430

HYDROGEN ISOTOPES
Isotope effect on hydrogen site energies for two metal dihydrides
[SAND-79-1541C] N81-14039

HYDROGEN OXYGEN FUEL CELLS
Development of a crude gas/air fuel cell system
[BMFT-FB-T-79-103] N81-14404

HYDROGEN RECOMBINATIONS
Catalyst and process development for hydrogen preparation from future fuel cell feedstocks
[DOE/ET-15383/18] N81-14463

HYDROLOGY
Seasat views North America, the Caribbean, and Western Europe with imaging radar
[NASA-CR-163825] N81-14372

HYDROLOGY MODELS
Air Force runoff model (AFRUM) user manual documentation
[AD-A091717] N81-14380

HYDROLYSIS
Alcohol production from agricultural and forestry residues
[DOE/EV-0108] N81-14125

HYDROSTATIC PRESSURE
Experiments with thin-walled, isotropic cones subjected to axial load, axial load combined with constant internal pressure and external hydrostatic pressure
[DFVLR-MITT-80-02] N81-14348

HYDROTHERMAL SYSTEMS
Comparative assessment of five potential sites for hydrothermal magma systems: Geochemistry --- The Geysers-Clear Lake region, Long Valley, Rio Grand Rift, Roosevelt Hot Springs, and the Salton Trough
[LBL-11410] N81-14471

HYGRAL PROPERTIES
Literature research on the mechanical properties of fibre composite materials. Analysis of the state of the art, volume 1
[RAE-LIB-TRANS-2045] N81-14003

HYPERBOLIC COORDINATES
Numerical generation of two-dimensional orthogonal curvilinear coordinates in an Euclidean space
N81-14726

HYPERBOLIC DIFFERENTIAL EQUATIONS
A random choice finite-difference scheme for hyperbolic conservation laws
[DOE/ER-03077/167] N81-14908

HYPERBOLIC FUNCTIONS
Use of hyperbolic partial differential equations to generate body fitted coordinates N81-14723
Modified Nystroem methods for semi-discrete hyperbolic differential equations
[MC-NW-78/80] N81-14735

HYPERGEOMETRIC FUNCTIONS
On the expansion of confluent hypergeometric functions in terms of Bessel functions
[MC-TW-192/79] N81-14737
The numerical computation of the confluent hypergeometric function U(a, b, z)
[MC-TW-202/80] N81-14747
Rapid calculation of sin(x)
[FOA-C-10150-M8] N81-14749

HYPERONS
Research in elementary particle physics
[DOE/ER-03230/T1] N81-14813

HYPOTHESES
Multiparameter hypothesis testing and acceptance sampling
[AD-A091607] N81-14340

ICE
Ice-maker heat pump development
[ORNL/CON-50] N81-14282

ICE FORMATION
Icing instrumentation N81-14559
Aircraft icing instrumentation: Unfilled needs --- rotary wing aircraft N81-14560

ICE REPORTING
The ability of passive microwave systems to detect sea ice --- Gulf of Bothnia, Baltic Sea
[REPT-S-113] N81-14374

IDAHO
Industrial application of geothermal energy in southeast Idaho
[DOE/ID-12010/4] N81-14454

IDENTITIES
Some notes on the gamma function
[FOA-C-10160-M8] N81-14751

IMAGE PROCESSING
Improved noise suppression for multiband imagery
[AD-A091815] N81-14196
Feature tagging
[AD-A091691] N81-14378
Processing of sequential and holistic stimuli in left and right visual fields
[AD-A091588] N81-14619
Studies of some algorithms for digital picture processing
[TRITA-NA-8003] N81-14656
Antifact removal in frequency domain compressed imagery
[AD-A091533] N81-14663
A unilateral representation for autoregressive random field models
[AD-A091644] N81-14664
Three dimensional digital technology
[AD-A091045] N81-14688

IMAGING TECHNIQUES
The study and modeling of high temperature fatigue crack propagation in austenitic stainless steel
[DOE/ER-10475/T1] N81-14067
Analysis and development of image statistics and redundancy removal
[AD-A091600] N81-14381
Applications of the Fast Fourier Transform. Citations from the NTIS data base
[PB80-815491] N81-14677
Imaging of surfaces and defects of crystals
[DOE/ER-02995/4] N81-14903
Atmospheric Emission Photometric Imaging on Spacelab (AEPI) N81-14946
Wide angle Michelson Doppler imaging interferometer --- measuring atmospheric emissions N81-14949

IMPACT DAMAGE
The effects of warhead-induced damage on the aeroelastic characteristics of lifting surfaces. Volume 1: Aeroelastic effects
[AD-A091674] N81-13955

IMPEDANCE MATCHING
Calculation of traveling-wave wire antenna arrays with mutual impedances
[REPT-S-111] N81-14191

IMPLANTED ELECTRODES (BIOLOGY)
Subcutaneous electrode structure
[NASA-CASE-ARC-11117-1] N81-14612

IMPURITIES
Impurity studies in fusion devices using laser-fluorescence-spectroscopy
[CONF-801037-17] N81-14048
The effects of radiating impurities and Boehm transport in a cool plasma mantle
[TRITA-PFU-80-05] N81-14865

INCINERATORS
Design considerations for a thermal decomposition analytical system
[PB80-219116] N81-14054

INCLUSIONS
Development of soft magnetic materials with special properties
[BMFT-FB-T-79-32] N81-13996

INCOHERENT SCATTER RADAR
Ionospheric effects of rocket exhaust products (HEAO-C, Skylab and SPS-HLLV)
[DOE/ER-0082] N81-14544

INCOMPRESSIBLE FLOW
Stability of three-dimensional shear flows: Criteria for inviscid disturbance excitation
[DFVLR-FB-80-05] N81-14272

INDEPENDENT VARIABLES
Multiparameter hypothesis testing and acceptance sampling
[AD-A091607] N81-14340

INDEXES (DOCUMENTATION)
DOE/DOD environmental data bank index --- numerical definitions of environments to which equipment is disposed
[SAND-79-2130] N81-14506

INDIUM
Ultrasonic attenuation in normal and superconducting indium
[AD-A091605] N81-14797

INDUCTORS
Superconductor design and loss analysis for a 20 MJ induction heating coil
[LA-UR-80-2742] N81-14256

INDUSTRIAL ENERGY
Low energy futures for the United States
[DOE/PE-0020] N81-14456
Industrial cogeneration case studies
[EPRI-EM-1531] N81-14467
Solar ponds. Citations from the NTIS data base
[PB80-814460] N81-14494

INDUSTRIAL SAFETY
Energy policy study. Volume 10: Nuclear power regulation
[DOE/EIA-0201/10] N81-14423

INDUSTRIES
U.S. metric board 1979 survey of selected large U.S. firms and industries
[AD-A091618] N81-14178
Assessment of industrial activity in the utilization of biomass for energy
[DOE/PE-70090/01] N81-14457

INELASTIC SCATTERING
Research in elementary particle physics
[DOE/ER-03230/T1] N81-14813
Moment theory investigations of born approximation scattering phenomena N81-14821

INELASTIC STRESS
A boundary element formulation for planar time-dependent inelastic deformation of plates with cutouts
[DOE/ER-02733/26] N81-14359
Numerical analysis of planar, time-dependent inelastic deformation of plates with cracks by the boundary element method
[DOE/ER-02733/27] N81-14360
Boundary element analysis of time-dependent inelastic deformation of cracked plates loaded in anti-plane shear
[DOE/ER-02733/28] N81-14361
The inelastic bending of a nickel beam at several temperatures: Experiment and prediction --- prismatic bars
[DOE/ER-02733/29] N81-14362

INEQUALITIES
Inequalities connecting eigenvalues and nonprincipal subdeterminants
[AD-A091503] N81-14786

INERTIAL CONFINEMENT FUSION
Fusion driver study --- pulsed lasers system for inertial confinement fusion
[DOE/DP-40006/1] N81-14872

INERTIAL GUIDANCE
Inertial navigation and guidance. Citations from the International Aerospace Abstracts data base
[NASA-CR-163838] N81-13946

INERTIAL NAVIGATION
Flight test investigation of LORAN-C for en route navigation in the Gulf of Mexico
[AD-A091637] N81-13945
Inertial navigation and guidance. Citations from the International Aerospace Abstracts data base
[NASA-CR-163838] N81-13946

INERTIAL UPPER STAGE
IUS solid rocket motor contamination prediction methods N81-14157

INFORMATION FLOW
Extracting unidimensional chains from multidimensional datasets: A graph theory approach
[AD-A091693] N81-14765

INFORMATION MANAGEMENT
Energy information referral directory, second quarter 1980
[DOE/EIA-0205/80-2Q] N81-14424
Improvements in the digitizing of analogue information
[TDB-343] N81-14919

INFORMATION RETRIEVAL
California Water Resources Center: chronicle of research, 1957-1980 --- bibliographies
[PB80-222276] N81-14384
Evaluation of atmospheric density models and preliminary functional specifications for the Langley Atmospheric Information Retrieval System (LAIRS)
[NASA-CR-159374] N81-14554

INFORMATION SYSTEMS
Automated medical information system of the Los Alamos Scientific Laboratory
[LA-UR-80-2160] N81-14621
Design and development of a seismic data center
[AD-A091621] N81-14924

INFRARED ASTRONOMY
Activities during 1979: Astronomical Research
[ISSN-0531-4496] N81-14936

INFRARED ASTRONOMY SATELLITE
Outgassing tests on iras solar panel samples N81-14156

INFRARED DETECTORS
Evaluation and assessment of low noise preamplifiers for infrared detectors
[CD.6500671] N81-14837

INFRARED RADIATION
Solar panel thermal cycling testing by solar simulation and infrared radiation methods N81-14164

INFRARED SPECTRA
Infrared emission spectroscopy of low pressure gaseous discharges, 3
[AD-A091744] N81-14540

INORGANIC COMPOUNDS
Bibliography of fluid density: Experimental determinations on single substances over a temperature range exceeding 40 K
[NPL-CHEM-106] N81-14264

INPUT/OUTPUT ROUTINES
Computer science and technology: Conversion
[PB80-215338] N81-14644
S2KPLOT/DOEPLOT, implementation and programmers manual
[PB80-219926] N81-14671

INSOLATION
Design and fabrication of terrestrial, photovoltaic solar generators for field testing in regions of intensive insolation
[BMFT-FB-T-79-34] N81-14400
Site insolation and wind power characteristics: Technical report Midwest region
[DOE/CS-20160-01-VOL-4] N81-14586
Site insolation and wind power characteristics: Technical report Western region (south section)
[DOE/CS-20160-01-VOL-6] N81-14587
Site insolation and wind power characteristics: Technical report Western region (north section)
[DOE/CS-20160/01-VOL-5] N81-14588

INSTRUCTION SETS (COMPUTERS)
How inefficient are stack-oriented abstract machines?
[MC-IW-123/79] N81-14630
Refinements to the Boolean approach to automatic data editing
[ORNL/TM-7156] N81-14925

INSTRUMENT ERRORS
Evaluation of orifice meter recorder measurement errors in lower and upper capacity ranges
[DOE/BC-10025/18] N81-14295

INSTRUMENT FLIGHT RULES
Development of a computer program data base of a navigation aid environment for simulated IFR flight and landing studies
[NASA-TM-80064] N81-13959

INTAKE SYSTEMS
Effects of downstream distance on turbulence decay for the compressor research facility low conditioning system
[AD-A091543] N81-14276
Ray theory to predict the propagation of broadband fan noise
[PNR-90030] N81-14794

INTEGRAL CALCULUS
On the correspondence between two-dimensional real vector functions and functions of a complex variable and its application in electromagnetics
[REPT-S-112] N81-14223
INTEGRAL EQUATIONS
A boundary element formulation for planar time-dependent inelastic deformation of plates with cutouts
[DOE/ER-02733/26] N81-14359
Numerical analysis of planar, time-dependent inelastic deformation of plates with cracks by the boundary element method
[DOE/ER-02733/27] N81-14360
Boundary element analysis of time-dependent inelastic deformation of cracked plates loaded in anti-plane shear
[DOE/ER-02733/28] N81-14361
Linear multistep methods and the construction of quadrature formulae for Volterra integral and integro-differential equations
[MC-NW-76/79] N81-14733
Superconvergence in collocation and implicit Runge-Katta methods for Volterra-type integral equations of the second kind
[MC-NW-80/80] N81-14743
INTEGRATED CIRCUITS
Large-scale integrated MOS circuits with small dimensions. Preparation of thin films
[BMFT-FB-T-79-55] N81-14226
Integrated RC-circuits in ALTA-technology on one substrate
[BMFT-FB-T-79-107] N81-14227
Development of technical integrated circuits
[BMFT-FB-T-79-41] N81-14228
Integrated circuits for remote command and data transmission
[BMFT-FB-T-79-50] N81-14230
Monolithically integrated circuits on GaAs
[BMFT-FB-T-79-176] N81-14239
Research in computer simulation of integrated circuits
[AD-A091609] N81-14245
Performance degradation of a 7400 TTL NAND gate due to sinusoidal interference
[AD-A091745] N81-14249
Computer aided design of microcircuits. Citations from the NTIS data base
[PB80-814296] N81-14258
Computer aided design of microcircuits. Citations from the Engineering Index data base
[PB80-814304] N81-14259
INTEGRATED ENERGY SYSTEMS
Solar heating, cooling, and domestic hot water system installed at Kaw Valley State Bank and Trust Company, Topeka, Kansas
[NASA-CR-161595] N81-14393
Development and preparation of industrial scale manufacturing processes for a modular solar-assisted house-heating-system, phase 2B
[BMFT-FB-T-79-85] N81-14407
Six kilowatt, residential photovoltaic power systems study; design, performance, economics, market potential
[UCID-18776] N81-14487
INTERFACES
Electrochemical and surface analysis of the reactive interfaces in the Li (Si)/FeS2 primary battery
[SAND-79-2155] N81-14413
A versatile microcomputer-based temperature controller
[SAND-79-2313] N81-14640
Mechanism for diffusion induced grain boundary migration
[DOE/ER-05002/13] N81-14904
INTERFACIAL TENSION
SOLA-VOF: A solution algorithm for transient fluid flow with multiple free boundaries
[LA-8355] N81-14281
INTERFEROMETERS
Rocket sled improved velocity measuring system feasibility study
[AD-A091634] N81-13978
INTERMOLECULAR FORCES
Development of empirical potential functions for the study of molecular geometry and applications to chlorophyll a dimers
[DOE/ER-02837-T1] N81-14810
INTERNAL COMBUSTION ENGINES
Alternate fuels for industrial combustion engines. Report on task 018
[FE-2468-77] N81-14130
The case against electric vehicles is running out of gas
[SAND-79-1770] N81-14928
INTERNAL PRESSURE
Experiments with thin-walled, isotropic cones subjected to axial load, axial load combined with constant internal pressure and external hydrostatic pressure
[DFVLR-MITT-80-02] N81-14348
INTERNAL WAVES
Internal tides and inertial oscillations as inferred from current and temperature measurements in the equatorial Pacific
[PB80-225568] N81-14603
INTERNATIONAL COOPERATION
Space research activity in Italy. Report to COSPAR N81-14959
INTERNATIONAL RELATIONS
Internal seismological stations for monitoring a comprehensive test ban theory
[FOA-C-20358-T1] N81-14535
INTERPOLATION
Misspecification of trend in spatial random function interpolation with application to oxidant mapping
[DOE/EV-02874/59] N81-14517
Finite difference grid generation by multivariate blending function interpolation N81-14696
Three dimensional spline-generated coordinate transformations for grids around wing-body configurations N81-14707
INTERSTELLAR GAS
Enhanced interaction of the solar wind and the interstellar neutral gas by virtue of a critical velocity effect
[TRITA-EPP-79-19] N81-14942
INTRAMOLECULAR STRUCTURES
Development of empirical potential functions for the study of molecular geometry and applications to chlorophyll a dimers
[DOE/ER-02837-T1] N81-14810
INVARIANCE
Duality in polynomial models with some applications to geometric control theory
[MC-BW-115/79] N81-14682
INVERTERS
Base drive for paralleled inverter systems
[NASA-CASE-NPO-14163-1] N81-14220
INVISCID FLOW
An investigation into grid patching techniques N81-14708
IODINE
NPL-PTB intercomparison of iodine-stabilized ion lasers
[NPL-MOM-42] N81-14308
IODINE COMPOUNDS
Perfluoroalkyl polytriazines containing pendent iododifluoromethyl groups
[NASA-CASE-ARC-11241-1] N81-14016
ION ACCELERATORS
Investigations and developments on a Hall-Ion-Thruster
[DFVLR-FB-80-09] N81-13994
ION BEAMS
Controlled cadmium telluride thin films for solar cells applications
[SERI/PR-9131-1-T1] N81-14482
Heavy ion beam probing
[DOE/ET-53004/2] N81-14822
Snow: A digital computer program for the simulation of ion beam devices
[SAND-79-1027] N81-14823
Field emission electric propulsion ion optics of slit emitters and beam focussing
[CLM/RR/E1/28] N81-14836
ION CURRENTS
Study of electric field and ion effects on HVDC lines
[DOE/RA-50153/1] N81-14253
ION CYCLOTRON RADIATION
Wave propagation in a deuterium-hydrogen-oxygen plasma in the range of ion cyclotron frequencies
[IPF-80-5] N81-14853
Linear mode conversion in a toroidal plasma
[TRITA-PFU-80-06] N81-14855
ION DENSITY (CONCENTRATION)
Negative ion chemistry in the terrestrial D-region and signal flow graph theory
[AERONOMICA-ACTA-A-217-1980] N81-14528
The swept angle retarding mass spectrometer: Initial results from the Michigan auroral probe sounding rocket
[NASA-TM-78317] N81-14530
A proposed neutron spectrometer system for JET
[TRITA-80-02] N81-14862
The measurement of the ion energy distribution and the hot ion density decay in torturi
[REPT-80-122] N81-14868
ION DISTRIBUTION
Snow: A digital computer program for the simulation of ion beam devices
[SAND-79-1027] N81-14823
ION EXCHANGE RESINS
Membrane consisting of polyquaternary amine ion exchange polymer network interpenetrating the chains of thermoplastic matrix polymer
[NASA-CASE-NPO-14001-1] N81-14076
ION EXCHANGING
Membrane consisting of polyquaternary amine ion exchange polymer network interpenetrating the chains of thermoplastic matrix polymer
[NASA-CASE-NPO-14001-1] N81-14076
ION IMPLANTATION
Planar transistors and impatt diodes with ion implantation
[BMFT-FB-T-79-16] N81-14224
Amorphous thin films for solar cell application --- magnetron sputtering, ion implantation, and activation energy
[DOE/ET-23040/2] N81-14419
Advanced ion implantation techniques
[BMFT-FB-T-79-37] N81-14897
ION MOTION
The drift, diffusion, and reactions of slow ions in gases
[AD-A091683] N81-14034
ION PROPULSION
Investigations and developments on a Hall-Ion-Thruster
[DFVLR-FB-80-09] N81-13994
ION SCATTERING
Thermodynamic interpretation of multiparticle emission in relativistic heavy ion collisions
[DOE/ER-03992/388] N81-14812
ION SOURCES
Helium-jet coupled mass separator: Advances and directions
[CONF-800870-1] N81-14047
ION TEMPERATURE
A proposed neutron spectrometer system for JET
[TRITA-80-02] N81-14862
Plasma stabilization experiment --- trapping cold ions
[DOE/ET-53087/2] N81-14876
IONIC MOBILITY
The drift, diffusion, and reactions of slow ions in gases
[AD-A091683] N81-14034
IONIC WAVES
Ion dynamics and the unified tearing mode
[DOE/ET-53036/23] N81-14817
IONIZATION
Unidirectional composites as electrodes/preionization sources for CO2 tea lasers
[AD-A091407] N81-14012
Electro-chemical polishing of cobalt in ethylene glycol and dimethyl formamide solutions of cobalt chloride
[PNR-90027] N81-14173
Molecular beam studies of low energy reactions
[AD-A091611] N81-14806
Critical ionization velocity effects in astrophysical plasmas
[TRITA-EPP-79-14] N81-14856
Some necessary parameters for a critical velocity interaction between the ionospheric plasma and a Xenon cloud
[TRITA-EPP-79-20] N81-14857
IONIZATION CROSS SECTIONS
High-energy positron ionization of adsorbed species in the impulse approximation
[AD-A091748] N81-14805

IONIZATION POTENTIALS
The drift, diffusion, and reactions of slow ions in gases
[AD-A091683] N81-14034
IONOGRAMS
Occurrences of the polar slant E condition (SEC) at Marssarssuaq, Godhavn, Thule, 1978
[ISBN-87-7478-165-0] N81-14537
ISIS topside sounder data gathered on Kwajalein Atoll during the summers of 1977 and 1978
[AD-A091845] N81-14539
IONOSPHERE
Ion-exosphere with anisotropic velocity distribution
[AERONOMICA-ACTA-A-215-1980] *N81-14527*
TEBPP: Theoretical and Experimental study of Beam-Plasma-Physics N81-14952
IONOSPHERIC COMPOSITION
Coordinated ionospheric and magnetospheric observations from the ISIS 2 satellite by the ISIS 2 experimenters. Volume 3: High-latitude charged particle, magnetic field, and ionospheric plasma observations during northern summer
[NASA-TM-82223] N81-14532
IONOSPHERIC DISTURBANCES
Occurrences of the polar slant E condition (SEC) at Marssarssuaq, Godhavn, Thule, 1978
[ISBN-87-7478-165-0] N81-14537
Waves In Space Plasmas (WISP)
[WISP-336] N81-14953
IONOSPHERIC ELECTRON DENSITY
Rocket measurements of electric fields, electron density and temperature during the three phases of auroral substorms
[TRITA-EPP-79-22] N81-14859
IONOSPHERIC HEATING
Environmental assessment for the Satellite Power System. Concept development and evaluation program: Effects of ionospheric heating on telecommunications
[DOE/ER-10003/T2] N81-14507
IONOSPHERIC PROPAGATION
Data obtained in radiowave propagation experiments on the path Kirunai Stockholm
[FOA-C-30187-E2] N81-14192
IONOSPHERICS
The WISP/HF system for Spacelab N81-14954
Magnetospheric multiprobes: Investigations and instrumentation N81-14955
IONS
The drift, diffusion, and reactions of slow ions in gases
[AD-A091683] N81-14034
Mixing length hypothesis in the dissipative trapped ion instability
[IPPJ-481] N81-14849
IRON
Electrochemical and surface analysis of the reactive interfaces in the Li (Si)/FeS2 primary battery
[SAND-79-2155] N81-14413
IRON ALLOYS
Development of soft magnetic materials with special properties
[BMFT-FB-T-79-32] N81-13996
Muon spin rotation research program
[NASA-CR-163829] N81-14801
IRON COMPOUNDS
Comparison of the temperature-dependent elastic modulus of TiFe with H-doped TiFe in the (111) direction
[AD-A091507] N81-14065
IRRADIATION
Solar panel thermal cycling testing by solar simulation and infrared radiation methods
N81-14164
The use of magnesium fluoride windows in an argon wall-stabilized mini-arc
[NPL-QU-58] N81-14171
ISIS-B
Coordinated ionospheric and magnetospheric observations from the ISIS 2 satellite by the ISIS 2 experimenters. Volume 3: High-latitude charged particle, magnetic field, and ionospheric plasma observations during northern summer
[NASA-TM-82223] N81-14532
ISOMERS
Naloxone inhibits and morphine potentiates. The adrenal steroidogenic response to ACTH
[NASA-TM-81253] N81-14606
ISOTROPY
Misspecification of trend in spatial random function interpolation with application to oxidant mapping
[DOE/EV-02874/59] N81-14517
ITALY
Space research activity in Italy. Report to COSPAR N81-14959
ITERATION
Numerical solution of two coupled nonlinear equations related to the limits of Buchstab's iteration sieve
[MC-NW-86/80] N81-14745
ITERATIVE SOLUTION
Performance of the Gradient Adaptive Equalizer with Inherent Optimal Adjusting Step in Presence of Noise and Arithmetic Errors
[FUB-35-1979] N81-14240
A guide to the theory of gear's method for the numerical solution of systems of stiff ordinary differential equations
[NPL-DNACS-29/80] N81-14741
Snow: A digital computer program for the simulation of ion beam devices
[SAND-79-1027] N81-14823

J

J-85 ENGINE
Organic compounds in the exhaust of a J85-5 turbine engine
[AD-A091712] N81-13966
JET AIRCRAFT NOISE
Exhaust noise in flight: The role of acoustic installation effects
[PNR-90029] N81-14793
The measurement of aero gas turbine noise
[PNR-90032] N81-14795
JET ENGINES
An evaluation of wind tunnel test techniques for aircraft nozzle afterbody testing at transonic Mach numbers
[AD-A091775] N81-13931
Prediction of sound radiated from different practical jet engine inlets
[NASA-CR-163824] N81-14789
JET EXHAUST
Organic compounds in the exhaust of a J85-5 turbine engine
[AD-A091712] N81-13966
JOINTS (JUNCTIONS)
Joining of ceramics for high performance energy systems
[DOE/ET-15359/1] N81-14092
Sealing joints and cracks, thin resurfacing, and locating voids under concrete slabs
[PB80-215635] N81-14182

K

KALMAN FILTERS
Extension of proportional navigation by use of optimal filtering and control methods
[DFVLR-FB-80-10] N81-13943
KAPTON (TRADEMARK)
Water-deuterium oxide exchange in polymers used in spacecraft applications --- outgassing from Mylar and Kapton N81-14159
KERNEL FUNCTIONS
Numerical aspects of orbit computation using series of kernel functions
[SER-A-89-MITT-155] N81-13980
A boundary element formulation for planar time-dependent inelastic deformation of plates with cutouts
[DOE/ER-02733/26] N81-14359
KEVLAR (TRADEMARK)
Literature research on the mechanical properties of fibre composite materials. Analysis of the state of the art, volume 1
[RAE-LIB-TRANS-2045] N81-14003
KINETICS
Kinetic processes at grain boundaries
[DOE/ER-05002/11] N81-14905
KORTEWEG-DEVRIES EQUATION
On a new series of integrable nonlinear evolution equations
[IPPJ-484] N81-14846

L

LABORATORIES
Information and guidelines for a proposed laboratory accreditation and product certification program for photovoltaic energy conversion systems
[PB80-217615] N81-14501
LAKE HURON
Phytoplankton composition and abundance in Southern Lake Huron
[PB80-216013] N81-14610
LAKE MICHIGAN
Determination of atmospheric phosphorous addition *to Lake Michigan*
[PB80-219124] N81-14385
A computer program for determining and displaying the geostrophic winds on Lakes Superior and Michigan
[PB80-225675] N81-14599
LAKE SUPERIOR
A computer program for determining and displaying the geostrophic winds on Lakes Superior and Michigan
[PB80-225675] N81-14599
LAMINAR FLOW
Laminar-airfoils for transport aircraft
[DFVLR-MITT-80-07] N81-13952
LAMINATES
Experimental modeling of laminar composites for multifrequency eddy current measurements
[BDX-613-2482] N81-14014
LAND USE
Seasat views North America, the Caribbean, and Western Europe with imaging radar
[NASA-CR-163825] N81-14372
LANGUAGE PROGRAMMING
Exception handling with multiexit statements
[MC-IW-125/79] N81-14850
A survey of high level microprogramming languages
[MC-IW-138/80] N81-14657
Formal SEMANOL specification of Ada
[AD-A091682] N81-14666
LARGE SCALE INTEGRATION
Convenience circuits --- amplitude compandored single sideband radios
[PB80-215783] N81-14213
Large scale integrated MOS-circuits with narrow structures: Artworks and masks
[BMFT-FB-T-79-104] N81-14233
LARGE SPACE STRUCTURES
Finite element structural model of a large, thin, completely free, flat plate --- for large space structures
[NASA-TM-81887] N81-13992
LARGE SPACE TELESCOPE
The faint object camera for the space telescope
[ESA-SP-1028] N81-14937
LASER ANEMOMETERS
Experimental and analytical development of the application of a transit laser velocimeter
[AD-A091762] N81-14302
LASER ANNEALING
Growth of HgCdTe by modified molecular beam epitaxy
[AD-A091822] N81-14899
LASER APPLICATIONS
Laser cutting and machining: Nonmetals. Citations from the Engineering Index data base
[PB80-814437] N81-14309
Laser cutting and machining: Metals Citations from the Engineering Index data base
[PB80-814445] N81-14310
Meteorological measurement system for support of atmospheric propagation studies
[UCRL-84547] N81-14594
LASER CAVITIES
Asymptotic analysis of a co-focal unstablet resonator without active media --- laser, cavity resonator
[CISE-1528] N81-14301
LASER DOPPLER VELOCIMETERS
Investigation of a transonic flow oscillation by real-time laser Doppler anemometry
[DFVLR-FB-80-04] N81-13924
Rocket sled improved velocity measuring system feasibility study
[AD-A091634] N81-13978
New methods to detect particle velocity and mass flux in arc-heated ablation/erosion facilities
N81-14166

A laser Doppler velocimeter for pulsatile water flow measurements in resonant hydraulic circuits
[CISE-1521] N81-14269
A computer-based laser Doppler velocimeter
[DFVLR-MITT-79-14] N81-14289
Remote sensing of wind speed and direction by laser Doppler anemometer
[DFVLR-MITT-79-18] N81-14576

LASER FUSION
High power laser and materials investigation --- laser fusion
[DOE/DP-40054/1] N81-14307
Experimental studies of electron impact depopulation of excited states of atoms: Applications to laser development for fusion and isotope separation
[DOE/ES-04199/1] N81-14816
Fusion driver study --- pulsed lasers system for inertial confinement fusion
[DOE/DP-40006/1] N81-14872

LASER GUIDANCE
A survey of simulation and test results for assessing RPV performance in a WBIC environment
[AD-A091603] N81-13954

LASER GYROSCOPES
Magneto-optic materials for biasing ring laser gyros. Computer model evaluating scattering from multilayer dielectric thin film structures containing a magnetic layer
[AD-A091540] N81-14293

LASER INTERFEROMETRY
Controls of aeronautical structures under fatigue testing by holographic pulsed lasers interferometry
[ISL-CO-218/79] N81-14300
Analysis method of the spatio-temporal structure of an acoustic field in the air with the aid of its optical Fourier transform
[ISL-CO-219/79] N81-14787

LASER MATERIALS
High power laser and materials investigation --- laser fusion
[DOE/DP-40054/1] N81-14307
Hydrogen fluoride and deuterium fluoride lasers. Citations from the International Aerospace Abstracts data base
[PB80-815871] N81-14313

LASER MODE LOCKING
Neodymium YAG lasers. Citations from the International Aerospace Abstracts data base
[NASA-CR-163835] N81-14316

LASER OUTPUTS
Study of combustion and flame processes initiated by IR laser-induced absorption
[COO-4695-4] N81-14049
Light communication systems. Citations from the NTIS data base
[PB80-815319] N81-14218
Laser excitation of fluorescence in the A-X system of NH
[NASA-TM-82231] N81-14304
Ultraviolet lasers. Citations from the International Aerospace Abstracts data base
[NASA-CR-163831] N81-14314
Laser welding. Citations from the Engineering Index data base
[PB80-815202] N81-14335

LASER PLASMAS
X-ray lasers. Citations from the International Aerospace Abstracts data base
[NASA-CR-163834] N81-14315

LASER PUMPING
Dye lasers. Citations from the NTIS data base
[PB80-813819] N81-14311
Dye lasers. Citations from the NTIS data base
[PB80-813801] N81-14312

LASER RANGE FINDERS
Estimation on the Wettzell coordinates from satellite laser ranging at Kootwijk, San Fernando and Wettzell
[VTH-LR-296] N81-14373

LASER SPECTROSCOPY
Impurity studies in fusion devices using laser-fluorescence-spectroscopy
[CONF-801037-17] N81-14048
Dye lasers. Citations from the NTIS data base
[PB80-813819] N81-14311
Laser-photoacoustic detection of water pollutants, phase 1
[PB80-222250] N81-14524

LASER WELDING
Laser welding. Citations from the Engineering Index data base
[PB80-815202] N81-14335

LASERS
Surface magnetic field/laser synergistic effects on the predissociation of adsorbed diatomic molecules
[AD-A091747] N81-14306

LATHES
Technology of machine tools, volume 1. Executive summary
[UCRL-52960-1] N81-14333
Technology of machine tools. Volume 4: Machine tool controls
[UCRL-52960-4] N81-14334

LAWS
Relevance of the second law of thermodynamics to energy conservation, volume 2
[DOE/CS-40178/1-VOL-2] N81-14906

LEACHING
Trace metals and Stationary Conventional Combustion Processes. Volume 1: Technical report
[PB80-216161] N81-14519

LEAD ACID BATTERIES
A 25 kW solar photovoltaic flat panel power supply for an electrodialysis water desalination unit in New Mexico
[DOE/ET-23061/1] N81-14444
Commercialization strategy for lead/acid batteries in utility load leveling applications
[DOE/ET-26934/1] N81-14448
Regenerative flywheel storage system, volume 2
[UCRL-15290-VOL-2] N81-14485
Regenerative flywheel energy storage system. Volume 3: Life cycle and cost-benefit analysis of a battery-flywheel electric car
[UCRL-15290-VOL-3] N81-14486
Research, development, and demonstration of lead-acid batteries for electric vehicle propulsion
[ANL/OEPM-79-8] N81-14930

LEAD ALLOYS
Properties of lead-lithium solutions
[UCRL-84273] N81-14052

LEADING EDGES
Space Shuttle Orbiter nose cap and wing leading edge certification test program N81-14168
Experimental study of supersonic viscous leeside flow over a slender delta wing
[NASA-TM-81248] N81-14265

LEAST SQUARES METHOD
Problems used in testing the efficiency and accuracy of the modified Gram-Schmidt least squares algorithm
[PB80-219777] N81-14672
The weighted linear least squares problem: An interval analysis approach to rank determination
[SAND-80-1260] N81-14757
An interval analysis approach to rank determination in linear least squares problems
[SAND-80-0655] N81-14758

LICENSING
Energy policy study. Volume 10: Nuclear power regulation
[DOE/EIA-0201/10] N81-14423
Documentation of and information on protective rights relating to government support on 'technological research and development
[BMFT-FB-T-79-186] N81-14918

LIE GROUPS
A study of the representations of SL(2,C) using noninfinitesimal methods
[MC-TW-190/79] N81-14736

LIFE CYCLE COSTS
Regenerative engine analysis
[AD-A091755] N81-13965
BICYCLE: A comptuer code for calculating levelized life-cycle costs
[LA-8493-MS] N81-14341
An energy and cost analysis of residential heat pumps in northern climates
[DOE/TIC-11275] N81-14462
Research, development and demonstration of nickel-zinc batteries for electric vehicle propulsion
[ANL/OEPM-79-11] N81-14480
Regenerative flywheel energy storage system. Volume 3: Life cycle and cost-benefit analysis of a battery-flywheel electric car
[UCRL-15290-VOL-3] N81-14486

LIFT AUGMENTATION
Downwash calculation at close range behind a trapezoidal wing in supersonic flow
[FFA-TN-AU-1661] N81-13925

LIFTING BODIES
The effects of warhead-induced damage on the aeroelastic characteristics of lifting surfaces. Volume 1: Aeroelastic effects
[AD-A091674] N81-13955
Modifications to the Hess three-dimensional lifting body code to convert from CDC FORTRAN to IBM FORTRAN with reductions in core requirements and execution times N81-14647

LIFTING ROTORS
Wind-tunnel test of an articulated helicopter rotor model with several tip shapes
[NASA-TM-80080] N81-13918

LIGHT ELEMENTS
Use of R-matrix methods for light element evaluations
[LA-UR-80-2673] N81-14050

LIGHT SCATTERING
Quasi elastic light scattering from macromolecules in solution
[CISE-1528] N81-14083
Air chemistry measurements in the lower atmosphere over Sweden: Data evaluation
[AC-45] N81-14533

LIGHTNING
The Federal Aviation Administration lightning protection modules designed for leadless devices
[AD-A091642] N81-13939
Observing lightning from ground-based and airborne stations N81-14566
Aeronautical concerns and National Aeronautics and Space Administration atmospheric electricity projects N81-14567
An automatic lightning detection system in northern California
[PB80-225592] N81-14597

LIMESTONE
Support studies in fluidized-bed combustion
[PB80-218613] N81-14056

LINE OF SIGHT
SEEFAR: An improved model for producing line-of-sight maps
[AD-A091855] N81-14377

LINE SPECTRA
Stark cell optoacoustic detection of constituent gases in sample
[NASA-CASE-NPO-14143-1] N81-14015
Spectroscopic investigations and determination of the temperature distribution in a metal halide discharge lamp
[NPL-QU-54] N81-14026
Analysis of spectral diffusion of localized triplet spin transitions within an inhomogeneous profile
[AD-A091714] N81-14033
The broadening of spectral lines by autoionization, radiative transitions, and collisions
[AD-A091506] N81-14036

LINEAR ACCELERATORS
Performance characteristics of large aperture, ten-cell, atmospheric pressure isobutane Cerenkov counters
[DOE/ER-14529/1] N81-14509

LINEAR EQUATIONS
On a class of optimal control problems with an almost cost free solution
[MC-TW-204/80] N81-14684
An interval analysis approach to rank determination in linear least squares problems
[SAND-80-0655] N81-14758
Automatic detection and treatment of oscillatory and/or stiff ordinary differential equations
[COO-2383-0068] N81-14759

LINEAR INTEGRATED CIRCUITS
Development of high complexity linear integrated circuits
[BMFT-FB-T-79-36] N81-14225

LINEAR PROGRAMMING
Linear programming and undiscounted stochastic games in which one player controls transitions
[MC-BW-122/80] N81-14777

LINEAR SYSTEMS
Duality in polynomial models with some applications to geometric control theory
[MC-BW-115/79] N81-14682

LIQUID CHROMATOGRAPHY
Development and optimization of methodologies for analysis of complex hydrocarbon mixtures
[DOE/ER-10554-T1] N81-14114
LIQUID COOLING
Thermal protection of reentry vehicles by actively cooled nosetips N81-14165
LIQUID CRYSTALS
Multiplex operation with passive displays
[BMFT-FB-T-80-017] N81-14835
LIQUID FLOW
Improved polymers for enhanced oil recovery synthesis and rheology
[DOE/BETC-5603/10] N81-14089
Two phase flow studies
[DOE/ET-27225/13] N81-14278
LIQUID HELIUM
Measurement of stability of cabled conductors cooled by He 1 at reduced temperature, or He 2
[GA-A-16012] N81-14255
Low cost cryostat
[NASA-CASE-NPO-14513-1] N81-14287
LIQUID HYDROGEN
Ammonia as a hydrogen energy-storage medium
[BNL-28293] N81-14477
LIQUID LEVELS
Acoustic fuel quantity measurement system. Signal conditioning unit
[AD-A091758] N81-13961
LIQUID METALS
Properties of lead-lithium solutions
[UCRL-84273] N81-14052
LIQUID NITROGEN
Use of cryopumps on large space simulation systems N81-14145
LIQUID PHASES
Vapor-liquid critical properties
[NPL-CHEM-107] N81-14021
LIQUID-SOLID INTERFACES
Electrochemical and surface analysis of the reactive interfaces in the li(si)feS2 primary battery
[SAND-79-2155C] N81-14901
LIQUID-VAPOR EQUILIBRIUM
An automatic method for checking the internal consistency of activity coefficients of binary mixtures
[NPL-CHEM-104] N81-14020
Phase-equilibria for design of coal gasification processes. Dew points of hot gases containing condensible tars
[DOE/ET-10603/T1] N81-14120
LIQUIDS
Investigation of sulfur-tolerant catalysts for selective synthesis of hydrocarbon liquids from coal derived gases
[DOE/ET-14809/3] N81-14118
Liquid fuels production from biomass
[DOE/ET-200550/T1] N81-14121
Chemical release module facility N81-14957
LITHIUM ALLOYS
Properties of lead-lithium solutions
[UCRL-84273] N81-14052
LITHIUM FLUORIDES
The development of fluorides for high power laser optics
[DOE/DP-40020/1] N81-14839
LITHIUM SULFUR BATTERIES
Electrochemical and surface analysis of the reactive interfaces in the li(si)feS2 primary battery
[SAND-79-2155C] N81-14901
LITHOLOGY
Direct detection of hydrocarbons using seismic procedures
[BMFT-FB-T-79-31] N81-14534
LOADS (FORCES)
Spectrum fatigue testing of simple test specimens containing artificial defects --- aluminum alloy 7075-T6 clad sheets with open holes
[FAA-TN-HU-2108] N81-14354
LOCI
On the geometry of multivariable root-loci
[RR-118] N81-14748
LOGIC CIRCUITS
FETSIM user's manual and example --- D.C. and transient analysis of MOS circuits
[NASA-CR-150800] N81-14222
A computer program for the generation of logic networks from task chart data
[NASA-CR-3364] N81-14646
LONG TERM EFFECTS
Development of a crude gas/air fuel cell system
[BMFT-FB-T-79-103] N81-14404
Long-term high-level waste technology
[DOE/SR/WM-79/2] N81-14827
LONGITUDINAL CONTROL
Landing flying qualities evaluation criteria for augmented aircraft
[NASA-CR-163097] N81-13969
Application of vector performance optimization to a robust control loop design for a fighter aircraft
[DFVLR-FB-80-14] N81-13970
System identification of the longitudinal motion of the DFVLR HFB 320 research aircraft with particular consideration of control surface effectiveness
[DFVLR-MITT-79-16] N81-13971
LORAN C
Flight test investigation of LORAN-C for en route navigation in the Gulf of Mexico
[AD-A091637] N81-13945
LOW PRESSURE
Infrared emission spectroscopy of low pressure gaseous discharges, 3
[AD-A091744] N81-14540
LOW SPEED
A computer program for the design and analysis of low-speed airfoils, supplement
[NASA-TM-81862] N81-13921
LOW TEMPERATURE
Atomic hydrogen storage method and apparatus
[NASA-CASE-LEW-12081-3] N81-14103
Evaluation and assessment of low noise preamplifiers for infrared detectors
[CD.6500671] N81-14837
LOW TEMPERATURE ENVIRONMENTS
An energy and cost analysis of residential heat pumps in northern climates
[DOE/TIC-11275] N81-14462
LUBRICANT TESTS
Solid lubricants: Molybdenum compounds. Citations from the Engineering Index data base
[PB80-815681] N81-14102
LUBRICANTS
High temperature lubricants and oils. Citations from the Engineering Index data base
[PB80-815590] N81-14096
High temperature lubricants and oils. Citations from the NTIS data base
[PB80-815582] N81-14097
High temperature lubricants and oils. Citations from the Engineering Index data base
[PB80-815574] N81-14098
LUBRICATING OILS
High temperature lubricants and oils. Citations from the Engineering Index data base
[PB80-815590] N81-14096
High temperature lubricants and oils. Citations from the NTIS data base
[PB80-815582] N81-14097
High temperature lubricants and oils. Citations from the Engineering Index data base
[PB80-815574] N81-14098
The control of microbial contamination of cutting fluid ZX-1
[MQAD-TP-727] N81-14338
LUMINAIRES
Spectroscopic investigations and determination of the temperature distribution in a metal halide discharge lamp
[NPL-QU-54] N81-14026
LUNAR EFFECTS
An analytical generator for drag-free satellite orbits
[RAE-TR-80085] N81-13981
LYMAN ALPHA RADIATION
Spacelab experiment: ALAE, Atmospheric Lyman-Alpha Emissions N81-14945

M

MACH NUMBER
A study of the sonic-boom characteristics of a blunt body at a Mach number of 6
[NASA-TP-1787] N81-13915
MACH-ZEHNDER INTERFEROMETERS
The Dalembertometer
[ISL-CO-220/79] N81-14292
MACHINE ORIENTED LANGUAGES
Abstracto 84: The next generation
[MC-IW-120/79] N81-14628
The revised ALGOL 68 test set
[MC-IW-122/79] N81-14629
The USAFA/8086. A state of the art microprocessor system. volume 2: Software documentation
[AD-A091779] N81-14638
MACHINE TOOLS
Electrochemical machining in-process data collection and control
[Y-2209] N81-14180
Method and tool for machining a transverse slot about a bore
[NASA-CASE-LAR-11855-1] N81-14319
Technology of machine tools, volume 1. Executive summary
[UCRL-52960-1] N81-14333
Technology of machine tools. Volume 4: Machine tool controls
[UCRL-52960-4] N81-14334
MACHINING
Laser cutting and machining: Nonmetals. Citations from the Engineering Index data base
[PB80-814437] N81-14309
Laser cutting and machining: Metals Citations from the Engineering Index data base
[PB80-814445] N81-14310
MAGMA
Comparative assessment of five potential sites for hydrothermal magma systems: Geochemistry --- The Geysers-Clear Lake region, Long Valley, Rio Grand Rift, Roosevelt Hot Springs, and the Salton Trough
[LBL-11410] N81-14471
MAGNESIUM FLUORIDES
The use of magnesium fluoride windows in an argon wall-stabilized mini-arc
[NPL-QU-58] N81-14171
MAGNETIC COILS
Measurement of stability of cabled conductors cooled by He 1 at reduced temperature, or He 2
[GA-A-16012] N81-14255
MAGNETIC DISKS
Floppy disk utility user's guide
[NASA-CR-160889] N81-14648
RSTS/E communications link via an asynchronous multiplexer
[ORNL/CSD/TM-128] N81-14670
MAGNETIC FIELD CONFIGURATIONS
Heavy ion beam probing
[DOE/ET-53004/2] N81-14822
A computer simulation on microinstabilities and anomalous resistivity near the magnetic neutral sheet
[IJJP-487] N81-14845
Disruptive shift of magnetic axis noncircular Tokamaks
[PPPL-1707] N81-14889
MAGNETIC FIELDS
Investigations and developments on a Hall-Ion-Thruster
[DFVLR-FB-80-09] N81-13994
Atomic hydrogen storage method and apparatus
[NASA-CASE-LEW-12081-3] N81-14103
Surface magnetic field/laser synergistic effects on the predissociation of adsorbed diatomic molecules
[AD-A091747] N81-14306
Magnetic energy storage
[LA-UR-80-2589] N81-14473
ISIS topside sounder data gathered on Kwajalein Atoll during the summers of 1977 and 1978
[AD-A091845] N81-14539
RMF concept: A rotating-magnetic-field technique for driving steady plasma currents in Compact Toroid devices
[LA-8516-MS] N81-14884
Separability of center of mass and relative motion of hydrogen in very strong magnetic fields
[DOE/ER-01545/284] N81-14907
MAGNETIC MIRRORS
Plasma stabilization experiment --- trapping cold ions
[DOE/ET-53087/2] N81-14876
National mirror fusion program plan
[UCAR-10042-80] N81-14892
Technology of direct conversion for mirror reactor end-loss plasma
[UCRL-84235] N81-14893
Model for ion confinement in a hot-electron tandem mirror anchor
[UCID-18802] N81-14894

MAGNETIC PROPERTIES
Development of soft magnetic materials with special properties
[BMFT-FB-T-79-32] N81-13996
MAGNETIC STORAGE
Bubble memory module
[NASA-CR-3380] N81-13993
MAGNETIC TRANSDUCERS
Ultrasonic aluminum wire bonding
[BDX-613-2485] N81-14330
MAGNETICALLY TRAPPED PARTICLES
Instrumentation and controls of an ignited Tokamak
[ORNL/TM-7153] N81-14885
Model for ion confinement in a hot-electron tandem mirror anchor
[UCID-18802] N81-14894
MAGNETO-OPTICS
Magneto-optic materials for biasing ring laser gyros. Computer model evaluating scattering from multilayer dielectric thin film structures containing a magnetic layer
[AD-A091540] N81-14293
MAGNETOACOUSTIC WAVES
Forced and free magnetoacoustic oscillations of toroidal argon plasmas
[IPF-8-3] N81-14852
Magnetoacoustic mode coupling to excitation structures
[TRITA-PFU-80-07] N81-14866
Experiment on magnetoacoustic mode excitation in FIVA device
[TRITA-PFU-80-08] N81-14867
MAGNETOHYDRODYNAMIC FLOW
The quiet-time pattern of auroral arcs as a consequence of magnetospheric convection
[DMI-GEOPHYS-PAPERS-R-56] N81-14536
An adaptive computation mesh for the solution of singular perturbation problems N81-14701
MAGNETOHYDRODYNAMIC GENERATORS
Superconducting magnets. Citations from NTIS data base
[PB80-816028] N81-14262
MHD coal-fired flow facility
[DOE/ET-10815/47] N81-14433
Study of seed reprocessing systems for open cycle coal fired MHD power plants. Task 1: Selection of processes for more detailed study
[DOE/ET-15613/T1] N81-14435
MHD electrode development
[DOE/ET-15529/T1] N81-14875
MAGNETOHYDRODYNAMIC STABILITY
Ion dynamics and the unified tearing mode
[DOE/ET-53036/23] N81-14817
Relation between weibel instability and magnetic field generating thermal instability
[IPPJ-485] N81-14843
Numerical study of explosive tearing mode instability in one-component plasmas
[IPPJ-486] N81-14844
A computer simulation on microinstabilities and anomalous resistivity near the magnetic neutral sheet
[IJJP-487] N81-14845
Electrostatic double layers and a plasma evacuation process
[TRITA-EPP-79-21] N81-14858
On the energy principle for plasma MHD stability in presence of an inhomogeneous magnetic vacuum field
[TRITA-PFU-80-04] N81-14864
The ballooning mode second stability region for sequences of Tokamak equilibria
[DOE/ET-53073/T1] N81-14869
Plasma stabilization experiment --- trapping cold ions
[DOE/ET-53087/2] N81-14876
Most probable ideal magnetohydrodynamic equilibria. 2: Reversed field pinch regime
[DOE/ET-53045/2] N81-14878
Model for ion confinement in a hot-electron tandem mirror anchor
[UCID-18802] N81-14894
Stability analysis of cylindrical Vlasov equilibria
[DOE/ET-53051/113] N81-14895
MAGNETOHYDRODYNAMIC WAVES
On a new series of integrable nonlinear evolution equations
[IPPJ-484] N81-14846
Non-axisymmetric (m = plus or minus 1) Alfven waves in a cylindrical plasma
[IPF-80-1] N81-14851
MAGNETOHYDRODYNAMICS
Magnetoacoustic mode coupling to excitation structures
[TRITA-PFU-80-07] N81-14866
Experiment on magnetoacoustic mode excitation in FIVA device
[TRITA-PFU-80-08] N81-14867
Compact Toroid Theory Planning Workshop
[DOE/ER-0062] N81-14873
Numerical solution of initial-value problems in plasma physics --- fusion research
[UCRL-85033] N81-14891
MAGNETOSPHERE
Coordinated ionospheric and magnetospheric observations from the ISIS 2 satellite by the ISIS 2 experimenters. Volume 3: High-latitude charged particle, magnetic field, and ionospheric plasma observations during northern summer
[NASA-TM-82223] N81-14532
The quiet-time pattern of auroral arcs as a consequence of magnetospheric convection
[DMI-GEOPHYS-PAPERS-R-56] N81-14536
Proceedings of the workshop on Modification of the Upper Atmosphere by Satellite Power System (SPS) Propulsion Effluents
[CONF-7906180] N81-14548
MAGNETOSPHERIC ION DENSITY
Spacelab energetic ion mass spectrometer N81-14950
MAGNETRON SPUTTERING
Recent advances in Pt coating of microspheres by a batch magnetron sputtering process
[UCRL-84478] N81-14074
MAINTENANCE
Automation of a maintainability prediction
[AD-A091787] N81-14339
Computer science and technology: Conversion
[PB80-215338] N81-14644
MALES
Tables relating pure-tone audiometric threshold to age
[NPL-AC-94] N81-14616
MAN MACHINE SYSTEMS
Application of microprocessors in measurement
[CONF-801116-1] N81-14641
A class of sequential input adaptive systems
[AD-A091655] N81-14687
MANAGEMENT INFORMATION SYSTEMS
Requirements for an historical stratification file using STD and CTD data
[AD-A091864] N81-14921
Specifications for an STD/CTD system at the NODC
[AD-A091866] N81-14922
MANAGEMENT METHODS
SPS Energy Conversion Power Management Workshop
[NASA-CR-163840] N81-14491
MANAGEMENT PLANNING
Microwave landing systems. Citations from the Engineering Index data base
[PB80-814643] N81-13947
Microwave landing systems. Citations from the NTIS data base
[PB80-814635] N81-13948
The RETE project. Integrated public and private cogeneration
[CISE-1527] N81-14406
Duality and the nonlinear roundtrip alpha center and covering problems on a tree
[MC-BW-123/80] N81-14778
The solution of manpower planning problems by the forward simplex method
[AD-A091521] N81-14916
The strategy for assessing the technical, environmental, and engineering feasibility of subseabed disposal
[SAND-79-2245] N81-14927
MANAGEMENT SYSTEMS
An overview of a minicomputer network
[SAND-80-0821] N81-14678
MANEUVERABILITY
The collision course: Conditions, guidance laws and properties
[DFVLR-FB-80-06] N81-13942
Theoretical investigation of the influence of spoiler dynamics on the handling qualities of an aircraft with direct lift control
[DFVLR-FB-80-07] N81-13975
MANIPULATORS
Device for coupling a first vehicle to a second vehicle
[NASA-CASE-GSC-12429-1] N81-14320
MANNED SPACECRAFT
Tables of artificial satellites, 1979
[AERONOMICA-ACTA-F-30-1980] N81-13983
MANUFACTURING
Hydroforming process for pressings
[PNR-90026] N81-14172
Research, development and demonstration of lead-acid batteries for electric vehicle propulsion
[ANL/OEPM-79-9] N81-14933
MAPPING
Feature tagging
[AD-A091691] N81-14378
Analysis and development of image statistics and redundancy removal
[AD-A091600] N81-14381
Computerized bathymetry and shorelines of the Great Lakes
[PB80-218308] N81-14387
MAPS
SEEFAR: An improved model for producing line-of-sight maps
[AD-A091855] N81-14377
MARINE ENVIRONMENTS
Meteorological factors affecting evaporation duct height climatologies
[AD-A091665] N81-14583
MARINE METEOROLOGY
Surface based remote sensing in marine air. Extensive analysis of echoes by several sensors reveals evolutionary atmospheric processes related to weather capable of affecting naval operations
[AD-A091518] N81-14584
MARKET RESEARCH
Market definition study of photovoltaic power for remote villages in developing countries
[NASA-CR-159880] N81-14391
Commercialization strategy for lead/acid batteries in utility load leveling applications
[DOE/ET-26934/1] N81-14448
Six kilowatt, residential photovoltaic power systems study; design, performance, economics, market potential
[UCID-18776] N81-14487
MARKETING
Urban waste conversion systems --- operational problems and marketing
[DSE-5580-T1] N81-14931
MARKOV PROCESSES
The determination of seasonal ARMA models
[AD-A091516] N81-14784
Modeling seasonal ARMA processes
[AD-A091515] N81-14785
MASERS
Precise RF timing signal distribution to remote stations --- fiber optics
[NASA-CASE-NPO-14749-1] N81-14186
MASKING
Large scale integrated MOS-circuits with narrow structures: Artworks and masks
[BMFT-FB-T-79-104] N81-14233
MASS SPECTROMETERS
The swept angle retarding mass spectrometer: Initial results from the Michigan auroral probe sounding rocket
[NASA-TM-78317] N81-14530
Monte Carlo simulation of negative ion collection by a rocket borne mass spectrometer
[AD-A091721] N81-14542
Spacelab energetic ion mass spectrometer N81-14950
MASS SPECTROSCOPY
Organic compounds in the exhaust of a J85-5 turbine engine
[AD-A091712] N81-13966
Photoelectron photoion molecular beam spectroscopy
[LBL-11434] N81-14820
MASS TRANSFER
Numerical solution of an advection-diffusion equation for a dissolved species in a pulsating crack
[NPL-DNACS-28/80] N81-14025

MATERIAL ABSORPTION
The use of approximate expressions in power transmission spectrometry
[NPL-DES-64] N81-14024
MATHEMATICAL MODELS
A contribution to stabilization of flight vehicle parachute systems
[DFVLR-MITT-80-05] N81-13926
Review and developments of dissemination models for airborne carbon fibers
[NASA-TM-80216] N81-14002
On one-dimensional acceleration waves in composite materials modeled as interpenetrating solid continua
[AD-A091615] N81-14011
Numerical solution of an advection-diffusion equation for a dissolved species in a pulsating crack
[NPL-DNACS-28/80] N81-14025
Measurements of fluctuating density and temperature in an axisymmetric flame
[AASU-342] N81-14028
Temperature sensitive dynamic cushioning function development and validation for aircap cellular polyethylene
[AD-A091604] N81-14086
Combustion mechanisms of solid propellants
[AD-A091857] N81-14108
Electrothermal response testing of electroexplosive devices with electrically conducting explosives
[SAND-80-0231] N81-14112
Research on alkaline zinc secondary electrodes with emphasis on model
[DOE/RL-90369/8] N81-14257
Hot film anemometry. Citations from the NTIS data base
[PB80-814288] N81-14297
Service life determination for the UH-60-A (UTTAS) helicopter elastomeric bearings
[AD-A091756] N81-14324
Security assessment of power systems
[DOE/ET-29100/11] N81-14447
Two well storage systems for combined heating and airconditioning by groundwater heatpumps in shallow aquifers
[LBL-11302] N81-14472
Environmental impacts of the satellite power system (SPS) on the middle atmosphere
[NASA-TM-82228] N81-14508
Analytical model for a vertical buoyant jet
[ORNL/TM-7140] N81-14513
One-dimensional simulation of temperature and moisture in atmospheric and soil boundary layers
[NASA-CR-163841] N81-14531
The quiet-time pattern of auroral arcs as a consequence of magnetospheric convection
[DMI-GEOPHYS-PAPERS-R-56] N81-14536
An explicit model for two-dimensional tidal circulation using triangular finite elements: WAVETL user's manual
[PB80-226046] N81-14604
Nerve impulse propagation in a branching nerve system: A simple model
[MC-TW-203/80] N81-14617
A review of control theory for digital systems
[RR-120] N81-14685
Generation of boundary and boundary-layer fitting grids N81-14694
An electrostatic analog for generating cascade grids N81-14695
Application of mathematics and statistics to biometrics, materials science, safety, environmental sciences, and related topics
[ORNL/CSD-61] N81-14760
Clines in a discrete time model in population genetics
[MC-TW-193/79] N81-14762
Time series in m dimensions: Spatial models
[AD-A091734] N81-14773
Identification of nonlinear systems using parameter estimation techniques
[RR-117] N81-14779
Development of empirical potential functions for the study of molecular geometry and applications to chlorophyll a dimers
[DOE/ER-02837-T1] N81-14810
Study of structure of nuclei with neutrons and nuclear data measurement for MFE
[DOE/ER-02490/1] N81-14811
Numerical solution of initial-value problems in plasma physics --- fusion research
[UCRL-85033] N81-14891
Heat transfer modeling for a non-fluidized particulate bed
[EGG/ENI-143] N81-14910
Network flow optimization for water resources planning with uncertainties in supply and demand
[PB80-221161] N81-14934
MATRICES (MATHEMATICS)
Use of R-matrix methods for light element evaluations
[LA-UR-80-2673] N81-14050
Biplot display multivariate matrices for inspection of data and diagnosis
[AD-A091821] N81-14659
Contour digitizing and tagging software (CONTAGRID)
[AD-A091736] N81-14661
Grid generation using coarse, smooth finite elements N81-14705
Grid generation for general three-dimensional configurations N81-14714
Use of hyperbolic partial differential equations to generate body fitted coordinates N81-14723
Curvilinear grids for sinuous river channels N81-14724
A body-fitted conformal mapping method with grid-spacing control N81-14727
Multiple grid methods for the solution of Fredholm integral equations of the second kind
[MC-NW-75/79] N81-14732
A study of the representations of SL(2,C) using noninfinitesimal methods
[MC-TW-190/79] N81-14736
Rapid calculation of sin(x)
[FOA-C-10150-M8] N81-14749
A general method of approximation particulary in L2
[FOA-C-10158-M8] N81-14750
The weighted linear least squares problem: An interval analysis approach to rank determination
[SAND-80-1260] N81-14757
An interval analysis approach to rank determination in linear least squares problems
[SAND-80-0655] N81-14758
Improving the accuracy of computed matrix eigenvalues
[ANL-80-84] N81-14761
Study of structure of nuclei with neutrons and nuclear data measurement for MFE
[DOE/ER-02490/1] N81-14811
MATRIX THEORY
Extracting unidimensional chains from multidimensional datasets: A graph theory approach
[AD-A091693] N81-14765
MAXIMA
Profit maximization models for exponential decay processes
[AD-A091522] N81-14768
MAXIMUM LIKELIHOOD ESTIMATES
System identification of the longitudinal motion of the DFVLR HFB 320 research aircraft with particular consideration of control surface effectiveness
[DFVLR-MITT-79-16] N81-13971
MEASURE AND INTEGRATION
Stabilization of the numerical integration of equations of motion
[DFVLR-FB-79-41] N81-14752
MEASURING INSTRUMENTS
On-line Zeeman atomic absorption spectroscopy for mercury analysis in oil shale gases
[PB80-216922] N81-14055
Specifications, tolerances, and other technical requirements for weighing and measuring devices. 1980 edition
[PB80-213622] N81-14184
MECHANICAL DEVICES
Fire extinguishing apparatus having a slidable mass for a penetrator nozzle --- for penetrating aircraft and shuttle orbiter skin
[NASA-CASE-KSC-11064-1] N81-14137
Device for coupling a first vehicle to a second vehicle
[NASA-CASE-GSC-12429-1] N81-14320
Mass synthesis for multiple balancing criteria of complex, planar mechanisms N81-14321
MECHANICAL DRIVES
Base drive for paralleled inverter systems
[NASA-CASE-NPO-14163-1] N81-14220
Security assessment of power systems
[DOE/ET-29100/11] N81-14447
MECHANICAL ENGINEERING
Mass synthesis for multiple balancing criteria of complex, planar mechanisms N81-14321
MECHANICAL IMPEDANCE
The control of microbial contamination of cutting fluid ZX-1
[MQAD-TP-727] N81-14338
MECHANICAL PROPERTIES
Literature research on the mechanical properties of fibre composite materials. Analysis of the state of the art, volume 1
[RAE-LIB-TRANS-2045] N81-14003
Development of MIL-HDBK-5 design allowable properties for several aerospace materials --- mechanical properties of 2024 T42 extrusion and Ti6Al2Sn4Zr2Mo duplex annealed sheet
[AD-A091602] N81-14063
Hot flow turning T-A6V titanium alloy
[PUR-90028] N81-14174
Mechanical properties of crystalline solids
[DOE/ER-02172/35] N81-14358
MEDICAL ELECTRONICS
Subcutaneous electrode structure
[NASA-CASE-ARC-11117-1] N81-14612
MEDICAL EQUIPMENT
Micro-fluid exchange coupling apparatus
[NASA-CASE-ARC-11114-1] N81-14605
Metabolic rate measurement system
[NASA-CR-160893] N81-14614
MEDICAL SCIENCE
Automated medical information system of the Los Alamos Scientific Laboratory
[LA-UR-80-2160] N81-14621
MEMBRANES
Membrane consisting of polyquaternary amine ion exchange polymer network interpenetrating the chains of thermoplastic matrix polymer
[NASA-CASE-NPO-14001-1] N81-14076
Photoproduction of hydrogen by membranes of green photosynthetic bacteria
[BNL-28334] N81-14129
MERCURY (METAL)
On-line Zeeman atomic absorption spectroscopy for mercury analysis in oil shale gases
[PB80-216922] N81-14055
MERCURY COMPOUNDS
Growth of HgCdTe by modified molecular beam epitaxy
[AD-A091822] N81-14899
MESH
Numerical grid generation techniques --- conference
[NASA-CP-2166] N81-14690
Mesh generation using algebraic techniques N81-14693
Generation of boundary and boundary-layer fitting grids N81-14694
Grid generation for time dependent problems: Criteria and methods N81-14699
An adaptive computation mesh for the solution of singular perturbation problems N81-14701
A simple numerical orthogonal coordinate generator for fluid dynamic applications N81-14710
A three-dimensional body-fitted coordinate system for flow field calculations on asymmetric nosetips N81-14711
An analytical transformation technique for generating uniformly spaced computational mesh N81-14717
Application of the multigrid method to grid generation N81-14718
Grid evolution in time asymptotic problems N81-14719
A two dimensional mesh verification algorithm N81-14720
Generation of C-type cascade grids for viscous flow computation N81-14721
Numerical generation of two-dimensional grids by the use of Poisson equations with grid control at boundaries N81-14722
MESONS
Performance characteristics of large aperture, ten-cell, atmospheric pressure isobutane Cerenkov counters
[DOE/ER-14529/1] N81-14509

MESOSCALE PHENOMENA
A preliminary look at AVE-SESAME 4 conducted on 9-10 May 1979
[NASA-TM-78314] N81-14552
AVE-SESAME IV: 25 mb sounding data
[NASA-TM-78315] N81-14553
MESOSPHERE
Proceedings of the workshop on Modification of the Upper Atmosphere by Satellite Power System (SPS) *Propulsion Effluents*
[CONF-7906180] N81-14548
Trace constituents in the middle atmosphere by high resolution UV spectroscopy N81-14947
METABOLIC WASTES
Design considerations for a thermal decomposition analytical system
[PB80-219116] N81-14054
Laser-photoacoustic detection of water pollutants, phase 1
[PB80-222250] N81-14524
METAL BONDING
Ultrasonic aluminum wire bonding
[BDX-613-2485] N81-14330
METAL COATINGS
Prevention of spline wear by soft metallic coatings --- aircraft engines
[AD-A091861] N81-14064
Hot corrosivity of coal gasification products on gas turbine alloys
[DOE/ET-13547/T1] N81-14070
Ceramic turbine components research and development. Part 2: Evaluation of MCrAlY/ZrO2 (Y2O3) thermal-barrier coatings exposed to simulated gas turbine environments
[EPRI-AP-1539-PT-2] N81-14331
METAL CRYSTALS
Muon spin rotation research program
[NASA-CR-163829] N81-14801
METAL CUTTING
Laser cutting and machining: Metals Citations from the Engineering Index data base
[PB80-814445] N81-14310
Method and tool for machining a transverse slot about a bore
[NASA-CASE-LAR-11855-1] N81-14319
METAL FATIGUE
Influence of environment on constant load and fatigue crack propagation of titanium alloys Ti-6Al-4V and Ti-8Al-1Mo-1V
[DFVLR-FB-80-08] N81-14059
METAL FILMS
Recent advances in Pt coating of microspheres by a batch magnetron sputtering process
[UCRL-84478] N81-14074
Investigation of surface plasmon dispersion
[AD-A091853] N81-14870
METAL HALIDES
Spectroscopic investigations and determination of the temperature distribution in a metal halide discharge lamp
[NPL-QU-54] N81-14026
METAL IONS
Systematic study of metal ion sorption on selected geologic media --- tracers for oil recovery systems
[DOE/BETC/OR-14] N81-14545
METAL MATRIX COMPOSITES
Effects of temperature, thermal exposure,and fatigue on an alumina/aluminum composite
[NASA-TP-1795] N81-14001
METAL OXIDE SEMICONDUCTORS
Physical and chemical processes for the generation of 1 micron structures
[BMFT-FB-T-79-51] N81-14023
Large scale integrated MOS-circuits with narrow structures: Artworks and masks
[BMFT-FB-T-79-104] N81-14233
METAL OXIDES
Investigation of electrochromic effects for display application
[BMFT-FB-T-79-42] N81-14022
METAL PLATES
Characterizing and improving the toughness of thick-sectioned 21/4Cr-1Mo electroslag weldments
[DOE/ET-12313/T1] N81-14344
METAL POWDER
Production of high purity metal and metal-alloy powders free of oxygen for subsequent processing of high-qualified sintering and semi-finished parts
[BMFT-FB-T-79-173] N81-14058
METAL SHEETS
Development of MIL-HDBK-5 design allowable *properties for several aerospace materials* --- mechanical properties of 2024 T42 extrusion and Ti6Al2Sn4Zr2Mo duplex annealed sheet
[AD-A091602] N81-14083
METAL SURFACES
Surface finishing
[NASA-CASE-MSC-12631-3] N81-14077
An experimental study of unipolar arcs in a low pressure mercury discharge
[DOE/ET-51010/8] N81-14871
METAL VAPORS
Chemical release module facility N81-14957
METAL WORKING
Solid lubricants: Graphite, polymers, fluorides, and general studies. Citations from the Engineering Index data base
[PB80-815673] N81-14101
Solid lubricants: Molybdenum compounds. Citations from the Engineering Index data base
[PB80-815681] N81-14102
Hydroforming process for pressings
[PNR-90026] N81-14172
METAL-METAL BONDING
The molybdenum-molybdenum triple bond. 9: Bis(1, 3-di-p-tolyltriazenido) olybdenum
[AD-A091550] N81-13997
METALLIC PLASMAS
Microscopic theory of dynamical correlations in the metallic electron liquid N81-14896
METALLIZING
Medium power silicon transistors --- fabrication and assembling
[BMFT-FB-T-79-160] N81-14237
METALS
An analytical chemical system for the determination of heavy metals and organic compounds
[DOE/EV-04320/3] N81-14046
Trace metals and Stationary Conventional Combustion Processes. Volume 1: Technical report
[PB80-216161] N81-14519
METEOROLOGICAL BALLOONS
AVE-SESAME IV: 25 mb sounding data
[NASA-TM-78315] N81-14553
METEOROLOGICAL CHARTS
A preliminary look at AVE-SESAME 4 conducted on 9-10 May 1979
[NASA-TM-78314] N81-14552
METEOROLOGICAL INSTRUMENTS
Survey of Workshops on Meteorological and Environmental Inputs to Aviation Systems N81-14556
Icing instrumentation N81-14559
Winds and wind shear in-situ sensors N81-14563
METEOROLOGICAL PARAMETERS
Estimates of incoming shortwave radiation and net radiation from standard meteorological data
[KNMI-WR-80-6] N81-14189
Meteorological and oceanographic observations on board Netherlands light vessels and the light platform Goeree in the North Sea
[KNMI-141-27] N81-14370
Assessment of the visibility impairment caused by the emissions from the proposed power plant at Boron, California
[NASA-CR-163103] N81-14504
Proceedings of the workshop on Modification of the Upper Atmosphere by Satellite Power System (SPS) Propulsion Effluents
[CONF-7906180] N81-14548
A preliminary look at AVE-SESAME 4 conducted on 9-10 May 1979
[NASA-TM-78314] N81-14552
Proceedings: Fourth Annual Workshop on Meteorological and Environmental Inputs to Aviation systems
[NASA-CP-2139] N81-14555
Survey of Workshops on Meteorological and Environmental Inputs to Aviation Systems N81-14556
Aviation meteorology research and development: A status report N81-14557
Federal Aviation Administration and National Weather Service Aviation Research and Development N81-14558
Aircraft icing instrumentation: Unfilled needs --- rotary wing aircraft N81-14560
Some considerations about wind predictions over sea using a 'limited area model' based on primitive *equations*
[KNMI-V-349] N81-14577
Meteorological factors affecting evaporation duct height climatologies
[AD-A091665] N81-14583
Site insolation and wind power characteristics: Technical report Midwest region
[DOE/CS-20160-01-VOL-4] N81-14586
Site insolation and wind power characteristics: Technical report Western region (south section)
[DOE/CS-20160-01-VOL-6] N81-14587
Site insolation and wind power characteristics: Technical report Western region (north section)
[DOE/CS-20160/01-VOL-5] N81-14588
Solar energy meteorological research and training site, region 5
[DOE/ET-20172] N81-14590
Automated emergency meteorological response system
[DP-MS-80-81] N81-14592
Meteorological measurement system for support of atmospheric propagation studies
[UCRL-84547] N81-14594
Preliminary results on a comparison of shallow water wave predictions
[KNML-WR-80-5] N81-14602
METEOROLOGICAL RADAR
Surface based remote sensing in marine air. Extensive analysis of echoes by several sensors reveals evolutionary atmospheric processes related to weather capable of affecting naval operations
[AD-A091518] N81-14584
METEOROLOGICAL SATELLITES
System techniques, satellites, orbit design, thermal control, power supply, attitude control, telemetry system
[DFVLR-FB-79-37] N81-13984
Studies in objective forecasting of mesoscale weather using an interactive computer system
[AD-A091752] N81-14580
METEOROLOGICAL SERVICES
An assessment of General Aviation utilization of advanced avionics technology
[NASA-CR-159328] N81-13941
Measuring weather for aviation safety in the 1980's N81-14568
Clear air turbulence forecasting techniques N81-14573
The program of the Techniques Development Laboratory in aviation weather forecasting N81-14574
An automated procedure for composition of severe weather watch areal redefining statements
[PB80-225584] N81-14595
METEOROLOGY
Some considerations about wind predictions over sea using a 'limited area model' based on primitive equations
[KNMI-V-349] N81-14577
METHANE
Opportunities for coal to methanol conversion
[DOE/CS-50009/01] N81-14113
Methane recovery from coalbeds. Project plan document, FY 1981
[DOE/TIC-11269] N81-14127
Methane or methanol via catalytic gasification of biomass
[PNL-SA-8049] N81-14131
Development of a preprototype sabatier CO2 reduction subsystem
[NASA-CR-160885] N81-14624
METHYL ALCOHOLS
An experimental study of methanol reformation
[AD-A091412] N81-14111
Alcohol production from agricultural and forestry residues
[DOE/EV-0108] N81-14125
Methane or methanol via catalytic gasification of biomass
[PNL-SA-8049] N81-14131
Ammonia as a hydrogen energy-storage medium
[BNL-28293] N81-14477
METHYLENE
Crosslinking of aromatic polyamides via pendant propargyl groups
[NASA-TM-81918] N81-14080

METHYLHYDRAZINE
Test and evaluation of an Energetics Science Incorporated Model 7660 electrochemical hydrazines *analyzer*
[AD-A091710] N81-14035

METRICATION
U.S. metric board 1979 survey of selected large U.S. firms and industries
[AD-A091618] N81-14178

MICHELSON INTERFEROMETERS
Wide angle Michelson Doppler imaging interferometer --- measuring atmospheric emissions N81-14949

MICROANALYSIS
Electron energy loss spectrometry
[BMFT-FB-T-79-181] N81-14802

MICROBALANCES
Performance of a flight qualified, thermoelectrically temperature controlled QCM sensor with power supply, thermal controller and signal processor N81-14158

MICROBALLOONS
Recent advances in Pt coating of microspheres by a batch magnetron sputtering process
[UCRL-84478] N81-14074

MICROCOMPUTERS
Experimental and analytical development of the application of a transit laser velocimeter
[AD-A091762] N81-14302
Metabolic rate measurement system
[NASA-CR-160893] N81-14614
A versatile microcomputer-based temperature controller
[SAND-79-2313] N81-14640
A survey of high level microprogramming languages
[MC-IW-138/80] N81-14657

MICROELECTRONICS
Verification of selected solvent soluble coatings using production hybrid microcircuits
[AD-A091554] N81-14087
A quick accurate method for calculating temperatures arising from rectangular and circular microcircuit heat sources
[AWRE-O-30/80] N81-14241
Manufacturing methods and technology program automatic in-process microcircuit evaluation
[AD-A091854] N81-14243
Ultrasonic aluminum wire bonding
[BDX-613-2485] N81-14330
Method and apparatus for fabricating improved solar cell modules
[NASA-CASE-NPO-14416-1] N81-14389

MICROPHONES
Sound source location measurements on high speed trains
[DFVLR-MITT-79-15] N81-14791

MICROPROCESSORS
A comparitive analysis of the Intel 8086, the Zilog Z8000 and the Motorola MC68000 microprocessors
[MC-IW-129/80] N81-14631
Bipolar microprocessor circuits
[BMFT-FB-T-79] N81-14633
The USAFA/8086. A state of the art microprocessor system. Volume 1: System hardware
[AD-A091772] N81-14637
The USAFA/8086. A state of the art microprocessor system. volume 2: Software documentation
[AD-A091779] N81-14638
Application of microprocessors in measurement
[CONF-801116-1] N81-14641

MICROSTRUCTURE
On the feasibility of quantitative ultrasonic determination of fracture toughness: A literature review
[NASA-CR-3356] N81-14337
Mechanical properties of crystalline solids
[DOE/ER-02172/35] N81-14358

MICROWAVE AMPLIFIERS
Analysis of oscillations in the gyrotron traveling wave amplifier
[AD-A091586] N81-14246

MICROWAVE ANTENNAS
Satellite Power System (SPS) antenna pointing control
[NASA-CR-3350] N81-14392

MICROWAVE CIRCUITS
Monolithically integrated circuits on GaAs
[BMFT-FB-T-79-176] N81-14239

MICROWAVE EMISSION
The ability of passive microwave systems to detect sea ice --- Gulf of Bothnia, Baltic Sea
[REPT-S-113] N81-14374

MICROWAVE EQUIPMENT
Symmetrical combiner analysis with S parameter *matrices and equivalent circuits --- microwave power* devices
[AD-A091784] N81-14244

MICROWAVE FREQUENCIES
Measurements of microwave transmission characteristics through various configurations of *fluidized bed materials*
[DOE/MC-14143/T1] N81-14208

MICROWAVE LANDING SYSTEMS
Microwave landing systems. Citations from the Engineering Index data base
[PB80-814643] N81-13947
Microwave landing systems. Citations from the NTIS data base
[PB80-814635] N81-13948

MICROWAVE OSCILLATORS
Analysis of oscillations in the gyrotron traveling wave amplifier
[AD-A091586] N81-14246
Design of a high power 240 GHz gyromonotron
[AD-A091511] N81-14250

MICROWAVE RADIOMETERS
Microwave signatures of snow measured in Finland
[REPT-S-109] N81-14578

MICROWAVE SENSORS
A multifrequency evaluation of active and passive microwave sensors for oil spill detection and assessment N81-14152

MICROWAVE SPECTRA
Monitoring pollutant gases from space using passive microwave techniques --- lowest layer of the troposphere
[NPL-QU-59] N81-14505

MICROWAVE TRANSMISSION
Frequency translating phase conjugation circuit for active retrodirective antenna array --- microwave transmission
[NASA-CASE-NPO-14536-1] N81-14185
Evaporation duct effects on maximum intercept range for 18-1 and 37.5-GHz emitters. A theoretical analysis of expected frequency distributions of intercept range for five oceanic areas
[AD-A091724] N81-14205
Environmental assessment for the Satellite Power System. Concept development and evaluation program: *Effects of ionospheric heating on* telecommunications
[DOE/ER-10003/T2] N81-14507

MICROWAVES
Activities of the Radio Laboratory, 1977
[REPT-S-110] N81-14190
Microwave heating of the ELMO bumpy torus relativistic electron ring
[DOE/ER-53092/13] N81-14874

MIDAIR COLLISIONS
Midair and near midair collisions on two- and three-dimensional curvilinear flight paths
[DFVLR-FB-80-13] N81-13944

MILITARY AIR FACILITIES
Southern California aviation system study
[PB80-215544] N81-13916

MILITARY AVIATION
Aircraft maintenance. Citations from the International Aerospace Abstracts data base
[PB80-815905] N81-13917

MILLIMETER WAVES
Extended applicability of optical wind sensing techniques
[AD-A091606] N81-14582
Improvement of the sensitivity of millimeter wave radio telescopes by synchronous tracking
[REPT-S-108] N81-14935

MILLING (MACHINING)
Method and tool for machining a transverse slot about a bore
[NASA-CASE-LAR-11855-1] N81-14319

MILLING MACHINES
Technology of machine tools, volume 1. Executive summary
[UCRL-52960-1] N81-14333
Technology of machine tools. Volume 4: Machine tool controls
[UCRL-52960-4] N81-14334

MINERAL METABOLISM
Computerized tomographic determination of spinal bone mineral content
[NASA-CR-160891] N81-14615

MINERALOGY
Electron microprobe mineral analysis guide
[NASA-CR-160895] N81-14018

MINERALS
Systematic study of metal ion sorption on selected geologic media --- tracers for oil recovery systems
[DOE/BETC/OR-14] N81-14545

MINNESOTA
The chemical composition of atmospheric precipitation in Minnesota and North Dakota
[DOE/EV-04327/1] N81-14510

MIRRORS
Development of sheet molding compound solar collectors with molded-in silvered glass reflective surfaces
[SAND-80-0702C] N81-14411
Solar mirror materials: Their properties and uses in solar concentrating collectors
[SAND-79-2190] N81-14412
The effect of soiling on solar mirrors and techniques used to maintain high reflectivity
[SAND-79-2422] N81-14415
Fusion reactor physics and technology
[DOE/ET-52048/T1] N81-14881

MISS DISTANCE
The collision course: Conditions, guidance laws and properties
[DFVLR-FB-80-06] N81-13942

MISSILE CONTROL
The collision course: Conditions, guidance laws and properties
[DFVLR-FB-80-06] N81-13942

MISSILE TRAJECTORIES
Metric accuracy analysis
[AD-A091749] N81-13982
A Monte Carlo model for determining copperhead probability of acquisition and maneuver
[AD-A091587] N81-13988

MISSILES
An analysis of the characteristics of Rayleigh waves produced by surface explosions
[AD-A091806] N81-14207

MIXING LENGTH FLOW THEORY
Mixing length hypothesis in the dissipative trapped ion instability
[IPPJ-481] N81-14849

MODULUS OF ELASTICITY
Comparison of the temperature-dependent elastic modulus of TiFe with H-doped TiFe in the (111) direction
[AD-A091507] N81-14065
Ultrasonic measurement of elastic moduli of 17-4 PH stainless steel and uranium - 2 molybdenum from minus 40 deg C to 800 deg C
[SAND-80-1121] N81-14355
Elastic moduli of boron carbide/copper composites from minus 40 deg C to 800 deg C by ultrasonic methods
[SAND-80-0881] N81-14356

MOLDING MATERIALS
The compression moulding of composite aero engine components with elevated thermal stability
[PNR-90036] N81-13962
Development of sheet molding compound solar collectors with molded-in silvered glass reflective surfaces
[SAND-80-0702C] N81-14411

MOLECULAR BEAM EPITAXY
Growth of HgCdTe by modified molecular beam epitaxy
[AD-A091822] N81-14899

MOLECULAR BEAMS
Molecular beam studies of low energy reactions
[AD-A091611] N81-14806
Photoelectron photoion molecular beam spectroscopy
[LBL-11434] N81-14820

MOLECULAR EXCITATION
Laser excitation of fluorescence in the A-X system of NH
[NASA-TM-82231] N81-14304
Vibrational energy transfer kinetics in molecular disequilibrium
[DOE/ER-10458/1] N81-14815

MOLECULAR GASES
Vibrational energy transfer kinetics in molecular disequilibrium
[DOE/ER-10458/1] N81-14815
MOLECULAR INTERACTIONS
Strategies for control of lattice architecture in low-dimensional molecular metals: Assembly of partially oxidized face-to-face linked arrays of metallomacrocycles
[AD-A091535] N81-14900
MOLECULAR STRUCTURE
Development of empirical potential functions for the study of molecular geometry and applications to chlorophyll a dimers
[DOE/ER-02837-T1] N81-14810
MOLECULES
Quasi elastic light scattering from macromolecules in solution
[CISE-1528] N81-14083
MOLTEN SALT ELECTROLYTES
Development of molten carbonate fuel cell power plant
[DOE/ET-17019/1] N81-14436
MOLYBDENUM
Study to optimize Cr-Mo steels to resist hydrogen and temper embrittlement
[DOE/ET-13513/T1] N81-14066
Ultrasonic measurement of elastic moduli of 17-4 PH stainless steel and uranium - 2 molybdenum from minus 40 deg C to 800 deg C
[SAND-80-1121] N81-14355
MOLYBDENUM COMPOUNDS
The molybdenum-molybdenum triple bond. 9: Bis(1, 3-di-p-tolyltriazenido) olybdenum
[AD-A091550] N81-13997
Solid lubricants: Molybdenum compounds. Citations from the Engineering Index data base
[PB80-815681] N81-14102
MOLYBDENUM DISULFIDES
Solid lubricants. Citations from the American Petroleum Institute data base
[PB80-816010] N81-14099
Solid lubricants. Citations from the NTIS data base
[PB80-815665] N81-14100
Atomic hydrogen storage method and apparatus
[NASA-CASE-LEW-12081-3] N81-14103
MOMENTS
Moment theory investigations of born approximation scattering phenomena N81-14821
MOMENTS OF INERTIA
Problem of phase transitions in nuclear structure
[BNL-28357] N81-13998
MOMENTUM TRANSFER
Investigation of nuclear structure and nuclear reactions induced by complex projectiles
[DOE/ER-04052/T1] N81-14826
MONITORS
Metabolic rate measurement system
[NASA-CR-160893] N81-14614
The flat-file alerter system
[AD-A091842] N81-14920
MONOMOLECULAR FILMS
Experimental sea slicks in the Marsen (Maritme Remote Sensing) exercise
[AD-A091850] N81-14376
MONOPULSE RADAR
Error sources applicable to precision trajectory radar calibration
[AD-A091654] N81-14204
MONOTONE FUNCTIONS
Clines in a discrete time model in population genetics
[MC-TW-193/79] N81-14762
MONTE CARLO METHOD
A Monte Carlo model for determining copperhead probability of acquisition and maneuver
[AD-A091587] N81-13988
Monte Carlo simulation of negative ion collection by a rocket borne mass spectrometer
[AD-A091721] N81-14542
MOORING
Development of an ASP (Air Stabilized Platform)
[PB80-221997] N81-14183
MORPHINE
Naloxone inhibits and morphine potentiates. The adrenal steroidogenic response to ACTH
[NASA-TM-81253] N81-14606
MORPHOLOGY
Clines in a discrete time model in population genetics
[MC-TW-193/79] N81-14762
MULTIPATH TRANSMISSION
Multipath induced errors, nonstatistical correction of position errors, correction of propagation anomalies
[DFVLR-MITT-79-17] N81-14188
Data obtained in radiowave propagation experiments on the path Kirunai Stockholm
[FOA-C-30187-E2] N81-14192
MULTIPLEXING
System for a displaying at a remote station data generated at a central station and for powering the remote station from the central station
[NASA-CASE-GSC-12411-1] N81-14221
Multiplex operation with passive displays
[BMFT-FB-T-80-017] N81-14835
MULTIPROCESSING (COMPUTERS)
Bitonic sort on ultracomputers
[MC-IW-117/79] N81-14626
A parallel processing operating system for the multiprocessor SEM
[ISS-T-79/11] N81-14632
MULTIVARIATE STATISTICAL ANALYSIS
An examination of the performance of two-stage group screening for use in computer simulation
[AD-A091553] N81-14668
Finite difference grid generation by multivariate blending function interpolation N81-14696
Application of mathematics and statistics to biometrics, materials science, safety, environmental sciences, and related topics
[ORNL/CSD-61] N81-14760
Random variate generation: A survey
[AD-A091343] N81-14774
MUONS
Muon spin rotation research program
[NASA-CR-163829] N81-14801
MYLAR (TRADEMARK)
Water-deuterium oxide exchange in polymers used in spacecraft applications --- outgassing from Mylar and Kapton N81-14159

N

NASA PROGRAMS
Standard spacecraft procurement analysis: A case study in NASA-DoD coordination in space programs
[R-2619-RC] N81-14915
Department of Housing and Urban Development, and certain independent agencies appropriations, fiscal year 1981, part 2
[GPO-62-143] N81-14926
NATURAL GAS
Underground natural gas storage in the United States 1979 - 1980 heating year
[DOE/EIA-0239/79] N81-14421
NAVIER-STOKES EQUATION
Numerical solutions of the Navier-Stokes equations for transonic afterbody flows
[NASA-TP-1784] N81-13919
The prediction of the flow and heat transfer in the vicinity of a jet in crossflow
[PNR-90025] N81-14271
Numerical methods in fluid flow problems. Citations from the NTIS data base
[PB80-814171] N81-14285
Finite difference grid generation by multivariate blending function interpolation N81-14696
NAVIGATION AIDS
Extension of proportional navigation by use of optimal filtering and control methods
[DFVLR-FB-80-10] N81-13943
Development of a computer program data base of a navigation aid environment for simulated IFR flight and landing studies
[NASA-TM-80064] N81-13959
NEGATIVE IONS
Negative ion chemistry in the terrestrial D-region and signal flow graph theory
[AERONOMICA-ACTA-A-217-1980] N81-14528
NEODYMIUM LASERS
Design study for the JET diagnostic systems Quasi-Continuous Laser Scattering --- joint European Tokamak
[IPF-80-2] N81-14298
Neodymium YAG lasers. Citations from the International Aerospace Abstracts data base
[NASA-CR-163835] N81-14316
NERVES
Nerve impulse propagation in a branching nerve system: A simple model
[MC-TW-203/80] N81-14617
NETHERLANDS
Meteorological and oceanographic observations on board Netherlands light vessels and the light platform Goeree in the North Sea
[KNMI-141-27] N81-14370
Seismological bulletin of the seismograph stations in the Netherlands, volume 63, 1975
[KNMI-108-63] N81-14538
NETWORK ANALYSIS
Symmetrical combiner analysis with S parameter matrices and equivalent circuits --- microwave power devices
[AD-A091784] N81-14244
NEUTRAL ATOMS
Measurement of visible and UV emission from Energetic Neutral Atom Precipitation (ENAP), on Spacelab N81-14948
NEUTRAL BEAMS
Plasma Physics of Intense Neutral Beam heating in Tokamaks
[CONF-790463-2] N81-14890
NEUTRAL GASES
Numerical simulation of density evolution in JIPP T-2 Tokamak
[IPPJ-483] N81-14841
Enhanced interaction of the solar wind and the interstellar neutral gas by virtue of a critical velocity effect
[TRITA-EPP-79-19] N81-14942
NEUTRAL SHEETS
A computer simulation on microinstabilities and anomalous resistivity near the magnetic neutral sheet
[IJJP-487] N81-14845
NEUTRON CROSS SECTIONS
Determination of neutron cross sections and resonance parameters for the osmium isotopes 186, 187, and 188, Tl-205, S-32, the stable tellurium isotopes and of the 82 keV inelastic cross section for U-238
[DOE/ER-02696/9] N81-14809
NEUTRON IRRADIATION
Neutron and gamma radiation effects on GaAlAs laser diodes
[AD-A091795] N81-14305
Homogeneous phosphorus of silicon by neutron transmutation
[BMFT-FB-T-79-52] N81-14898
NEUTRON PHYSICS
A proposed neutron spectrometer system for JET
[TRITA-80-02] N81-14862
NEUTRON SCATTERING
Study of structure of nuclei with neutrons and nuclear data measurement for MFE
[DOE/ER-02490/1] N81-14811
NEUTRON SPECTROMETERS
A proposed neutron spectrometer system for JET
[TRITA-80-02] N81-14862
NEUTRONS
Evaluation of photon production data from neutron-induced reactions
[CONF-800979-1] N81-14819
NEVADA
Interpretation of dipole-dipole electrical resistivity survey, Colado geothermal area, Pershing County, Nevada
[DOE/ID-12079/11] N81-14252
Nevada Nuclear Waste Storage Investigations: Quality
[NVO-196-17] N81-14830
NICKEL
Basic concepts for integrated RC networks and hybrid circuits on organic substrate foils
[BMFT-FB-T-79-87] N81-14231
The inelastic bending of a nickel beam at several temperatures: Experiment and prediction --- prismatic bars
[DOE/ER-02733/29] N81-14362
NICKEL ALLOYS
Development of soft magnetic materials with special properties
[BMFT-FB-T-79-32] N81-13996

Production of high purity metal and metal-alloy powders free of oxygen for subsequent processing of high-qualified sintering and semi-finished parts
[BMFT-FB-T-79-173] N81-14058
The stress behavior of three advanced nickel base superalloys during high temperature low cycle fatigue
[AD-A091694] N81-14061
Determination of phase transformation temperatures of titanium-nickel using differential thermal analysis
[AD-A091792] N81-14062
Hot corrosivity of coal gasification products on gas turbine alloys
[DOE/ET-13547/T1] N81-14070

NICKEL ZINC BATTERIES
Research, development and demonstration of nickel-zinc batteries for electric vehicle propulsion
[ANL/OEPM-79-11] N81-14480

NICKEL-IRON BATTERIES
Research, development, and demonstration of nickel iron batteries for electric vehicle propulsion
[ANL/OEPM-79-14] N81-14932

NITRIC OXIDE
Chemical kinetic models for combustion of hydrocarbons and formation of nitric oxide
[NASA-TP-1794] N81-14017

NITRIDES
Electrochemistry of acetylides, nitrides and carbon cathodes in molten halides
[DOE/ER-04445/T1] N81-14041

NITROGEN COMPOUNDS
Method for preparing addition type polyimide prepregs
[NASA-CASE-LAR-12054-2] N81-14078

NITROGEN OXIDES
NOx national emission inventory estimates
[PB80-224058] N81-14522

NOISE (SOUND)
Performance of the Gradient Adaptive Equalizer with Inherent Optimal Adjusting Step in Presence of Noise and Arithmetic Errors
[FUB-35-1979] N81-14240
The Dalembertometer
[ISL-CO-220/79] N81-14292

NOISE MEASUREMENT
The measurement of aero gas turbine noise
[PNR-90032] N81-14795

NOISE POLLUTION
Overview of the environmental concerns of coal transportation
[ANL/EES/TM-99] N81-14515
Maneuvering aircraft: Noise pollution and control. Citations from the NTIS data base
[PB80-815566] N81-14525

NOISE PREDICTION
Noise prediction for jetstar prop-fan test
[NASA-TM-81916] N81-14790
Ray theory to predict the propagation of broadband fan noise
[PNR-90030] N81-14794
A preliminary analysis of the audible noise of constant speed, horizontal axis wind turbine generators
[DOE/EV-0089] N81-14799

NOISE PREDICTION (AIRCRAFT)
Prediction of sound radiated from different practical jet engine inlets
[NASA-CR-163824] N81-14789

NOISE PROPAGATION
Assessment of ground effects on the propagation of aircraft noise: The T-38A flight experiment
[NASA-TP-1747] N81-14788
Ray theory to predict the propagation of broadband fan noise
[PNR-90030] N81-14794
Noise and noise abatement in fans and blowers: A review
[DFVLR-FB-80-16] N81-14796
Evaluation and assessment of low noise preamplifiers for infrared detectors
[CD.6500671] N81-14837

NOISE REDUCTION
Technological forecasting--aircraft design. Citations from the International Aerospace data base
[PB80-815970] N81-13957
Improved noise suppression for multiband imagery
[AD-A091815] N81-14196
Noise and noise abatement in fans and blowers: A review
[DFVLR-FB-80-16] N81-14796

NONADIABATIC THEORY
Adiabatic and non-adiabatic processes in thermal models of solar hard X-ray bursts
[NASA-CR-163839] N81-14943

NONDESTRUCTIVE TESTS
Electrothermal response testing of electroexplosive devices with electrically conducting explosives
[SAND-80-0231] N81-14112
Controls of aeronautical structures under fatigue testing by holographic pulsed lasers interferometry
[ISL-CO-218/79] N81-14300

NONEQUILIBRIUM CONDITIONS
Vibrational energy transfer kinetics in molecular disequilibrium
[DOE/ER-10458/1] N81-14815

NONFLAMMABLE MATERIALS
Aviation safety: Interior compartment materials
[GPO-50-388] N81-13933
Testimony of James J. Kramer, Associate Administrator for Aeronautics and Space Technology, National Aeronautics and Space Administration, accompanied by John H. Enders, Project Manager, Aviation Safety Technology Office, John A. Parker, Chemical Research Projects Office, NASA-Ames Research Center, and Demitrius A. Kourtides, Chemical Research Projects Office, NASA-AMES Research Center N81-13935
Testimony of Richard W. Taylor, Vice President and Special Assistant to the President, and Eugene A. Bara, Chief Engineer, Payloads Systems, Boeing Commercial Airplane Company N81-13936
Testimony of a panel consisting of: Lloyd E. Frisbee, Vice President, Engineering and Operations, Lockheed California Company; Lyle A. Wright, Director, Powerplant Engineering, Douglas Aircraft Company, accompanied by Doctor H. C. Schjelderup, Chief Technology Engineer, Materials and Process Engineering, and F. E. Duskin, Senior Design Engineer, Interiors Engineering, Douglas Aircraft Company N81-13937

NONLINEAR EQUATIONS
Nerve impulse propagation in a branching nerve system: A simple model
[MC-TW-203/80] N81-14617
Numerical solution of two coupled nonlinear equations related to the limits of Buchstab's iteration sieve
[MC-NW-86/80] N81-14745
Clines in a discrete time model in population genetics
[MC-TW-193/79] N81-14762
A time-discrete Boltzmann equation
[CTH-MATH-1980-1] N81-14782
On a new series of integrable nonlinear evolution equations
[IPPJ-484] N81-14846

NONLINEAR PROGRAMMING
Steepest edge algorithms in linear and nonlinear programming
[AD-A091608] N81-14662
Optimal control nonlinear programming, spline interpolation, numerical software
[DFVLR-MITT-80-03] N81-14681

NONLINEAR SYSTEMS
Control of dynamical systems
[AD-A091704] N81-14686
Analysis of estimation errors in the identification of nonlinear systems
[RR-115] N81-14776
Identification of nonlinear systems using parameter estimation techniques
[RR-117] N81-14779
A note on Kronecker products and related norms
[TRITA-NA-8001] N81-14783

NONLINEARITY
Effects of nonlinearities on wing store flutter
[MBB-FE-17/S/PUB/27] N81-13974
Nonlinear dynamic response of a uni-directional model for the tile/pad space shuttle thermal protection system
[NASA-TM-81901] N81-14345

NONPARAMETRIC STATISTICS
On the performance of a modified sign detector for M-dependent data
[AD-A091570] N81-14771

NONSTABILIZED OSCILLATION
Digital data reduction algorithm for oscillatory signals with an application to L-instability
[VTH-LR-298] N81-14194

NORMS
A note on Kronecker products and related norms
[TRITA-NA-8001] N81-14783

NORTH AMERICA
Seasat views North America, the Caribbean, and Western Europe with imaging radar
[NASA-CR-163825] N81-14372

NORTH CAROLINA
Carolina Geological Society field trip guidebook, 11-12 October 1980. Geological investigations of Piedmont and triassic rocks, central North Carolina and Virginia (with a field trip guide on the bedrock geology of south central Virginia)
[DOE/SR-00001/T2] N81-14547

NORTH DAKOTA
The chemical composition of atmospheric precipitation in Minnesota and North Dakota
[DOE/EV-04327/1] N81-14510

NORTH SEA
Meteorological and oceanographic observations on board Netherlands light vessels and the light platform Goeree in the North Sea
[KNMI-141-27] N81-14370
Experimental sea slicks in the Marsen (Maritme Remote Sensing) exercise
[AD-A091850] N81-14376
Preliminary results on a comparison of shallow water wave predictions
[KNML-WR-80-5] N81-14602

NORTHERN HEMISPHERE
Coordinated ionospheric and magnetospheric observations from the ISIS 2 satellite by the ISIS 2 experimenters. Volume 3: High-latitude charged particle, magnetic field, and ionospheric plasma observations during northern summer
[NASA-TM-82223] N81-14532
The Eastern Pacific Tropical Cyclone Strike Probability Program (EPSTRKP)
[AD-A091841] N81-14579
Global temperature patterns 6000 years ago
[DOE/EV-100097/1] N81-14591

NOSE CONES
Space Shuttle Orbiter nose cap and wing leading edge certification test program N81-14168

NOSE TIPS
Thermal protection of reentry vehicles by actively cooled nosetips N81-14165

NOZZLE FLOW
Primary calibrations of critical flow venturi nozzles in high-pressure gas
[NEL-666] N81-14270

NOZZLE WALLS
Primary calibrations of critical flow venturi nozzles in high-pressure gas
[NEL-666] N81-14270

NUCLEAR ELECTRIC POWER GENERATION
Technology characterizations: Environmental information handbook
[DOE/EV-0072] N81-14426
Medium-size high temperature gas-cooled reactor
[GA-A-15863] N81-14833

NUCLEAR EXPLOSIONS
An analysis of the characteristics of Rayleigh waves produced by surface explosions
[AD-A091806] N81-14207
Internal seismological stations for monitoring a comprehensive test ban theory
[FOA-C-20358-T1] N81-14535

NUCLEAR FUELS
A camera device for the measurement of pin bowing in AGR fuel elements
[TDB-350] N81-14291

NUCLEAR FUSION
Study of structure of nuclei with neutrons and nuclear data measurement for MFE
[DOE/ER-02490/1] N81-14811
Most probable ideal magnetohydrodynamic equilibria? 1: Tokamak regime and quasi-force-free states
[DOE/ET-53045/1] N81-14877
Instrumentation and controls of an ignited Tokamak
[ORNL/TM-7153] N81-14885
Numerical solution of initial-value problems in plasma physics --- fusion research
[UCRL-85033] N81-14891
National mirror fusion program plan
[UCAR-10042-80] N81-14892

Technology of direct conversion for mirror reactor end-loss plasma
[UCRL-84235] N81-14893

NUCLEAR HEAT
High temperature heat exchange: Nuclear process heat applications
[GA-A-16052] N81-14832

NUCLEAR MAGNETIC RESONANCE
NMR of small platinum particles
[DOE/ER-01198/1324] N81-14824

NUCLEAR MODELS
Application of the shell model to nuclear spectroscopy
[DOE/TIC-11287] N81-14828

NUCLEAR PHYSICS
A research program in theoretical high-energy physics
[COO-3130TA-352] N81-14912

NUCLEAR POWER PLANTS
Energy policy study. Volume 10: Nuclear power regulation
[DOE/EIA-0201/10] N81-14423

NUCLEAR REACTIONS
Use of R-matrix methods for light element evaluations
[LA-UR-80-2673] N81-14050
Nuclear excitations and reaction mechanisms
[DOE/ER-03235/1] N81-14825
Investigation of nuclear structure and nuclear reactions induced by complex projectiles
[DOE/ER-04052/T1] N81-14826
Nucleosynthesis of neutron-rich heavy nuclei during explosive helium burning in massive stars
[ATR-81(8454)-2] N81-14939

NUCLEAR REACTORS
Energy policy study. Volume 10: Nuclear power regulation
[DOE/EIA-0201/10] N81-14423
Study of structure of nuclei with neutrons and nuclear data measurement for MFE
[DOE/ER-02490/1] N81-14811
National mirror fusion program plan
[UCAR-10042-80] N81-14892
Technology of direct conversion for mirror reactor end-loss plasma
[UCRL-84235] N81-14893

NUCLEAR SCATTERING
Nuclear excitations and reaction mechanisms
[DOE/ER-03235/1] N81-14825

NUCLEAR SPIN
Isotope effect on hydrogen site energies for two metal dihydrides
[SAND-79-1541C] N81-14039
Pion interactions at medium energies
[DOE/ER-03948/12] N81-14814

NUCLEAR STRUCTURE
Problem of phase transitions in nuclear structure
[BNL-28357] N81-13998
Investigation of nuclear structure and nuclear reactions induced by complex projectiles
[DOE/ER-04052/T1] N81-14826
Application of the shell model to nuclear spectroscopy
[DOE/TIC-11287] N81-14828

NUCLEON-NUCLEON SCATTERING
Pion interactions at medium energies
[DOE/ER-03948/12] N81-14814

NUMBER THEORY
Numerical solution of two coupled nonlinear equations related to the limits of Buchstab's iteration sieve
[MC-NW-86/80] N81-14745
Hyperperfect numbers with more than two different prime factors
[MC-NW-87/80] N81-14746

NUMERICAL ANALYSIS
Dual methods and approximation concepts in structural synthesis
[NASA-CR-3226] N81-14347
Numerical analysis of planar, time-dependent inelastic deformation of plates with cracks by the boundary element method
[DOE/ER-02733/27] N81-14360
Evaluation of the language Ada for use in numerical computations
[NPL-DNACS-30/80] N81-14655
Linear multistep methods and the construction of quadrature formulae for Volterra integral and integro-differential equations
[MC-NW-76/79] N81-14733
Modified Nystroem methods for semi-discrete hyperbolic differential equations
[MC-NW-78/80] N81-14735
How many jumps? Variational characterization of the limit solution of a singular perturbation problem
[MC-TW-195/79] N81-14739
A guide to the theory of gear's method for the numerical solution of systems of stiff ordinary differential equations
[NPL-DNACS-29/80] N81-14741
The numerical computation of the confluent hypergeometric function U(a, b, z)
[MC-TW-202/80] N81-14747
Numerical methods for initial value problems
[AD-A091502] N81-14754

NUMERICAL CONTROL
Performed evaluation of unconstrained optimization techniques
[DFVLR-MITT-79-21] N81-14680

NUMERICAL FLOW VISUALIZATION
Numerical computations of swirling recirculating flow
[NASA-CR-165196] N81-14267

NUMERICAL INTEGRATION
Superconvergence in collocation and implicit Runge-Katta methods for Volterra-type integral equations of the second kind
[MC-NW-80/80] N81-14743

NUMERICAL STABILITY
Stabilization of the numerical integration of equations of motion
[DFVLR-FB-79-41] N81-14752

NUMERICAL WEATHER FORECASTING
Some considerations about wind predictions over sea using a 'limited area model' based on primitive equations
[KNMI-V-349] N81-14577

NUTRITIONAL REQUIREMENTS
Bioengineering aspects of inorganic carbon supply to mass algal cultures
[DOE/ET-20604/1] N81-14608

O

OBSERVATORIES
Activities during 1979: Astronomical Research
[ISSN-0531-4496] N81-14936

OCEAN CURRENTS
Alternative energy sources session ocean thermal energy conversion: Technology development
[PB80-218159] N81-14500
Internal tides and inertial oscillations as inferred from current and temperature measurements in the equatorial Pacific
[PB80-225568] N81-14603

OCEAN DATA ACQUISITIONS SYSTEMS
Meteorological and oceanographic observations on board Netherlands light vessels and the light platform Goeree in the North Sea
[KNMI-141-27] N81-14370

OCEAN SURFACE
Experimental sea slicks in the Marsen (Maritme Remote Sensing) exercise
[AD-A091850] N81-14376
Some considerations about wind predictions over sea using a 'limited area model' based on primitive equations
[KNMI-V-349] N81-14577
Preliminary results on a comparison of shallow water wave predictions
[KNML-WR-80-5] N81-14602

OCEAN THERMAL ENERGY CONVERSION
The effects of shear and roughness on vortex shedding patterns behind a circular cylinder at critical Reynolds numbers --- ocean thermal energy conversion cold water pipes
[DOE/NOAA/OTEC-1] N81-14284
Alternative energy sources session ocean thermal energy conversion: Technology development
[PB80-218159] N81-14500

OCEANOGRAPHIC PARAMETERS
Meteorological and oceanographic observations on board Netherlands light vessels and the light platform Goeree in the North Sea
[KNMI-141-27] N81-14370

OCEANOGRAPHY
Preliminary results on a comparison of shallow water wave predictions
[KNML-WR-80-5] N81-14602
Requirements for an historical stratification file using STD and CTD data
[AD-A091864] N81-14921
Specifications for an STD/CTD system at the NODC
[AD-A091866] N81-14922

OFFSHORE PLATFORMS
Development of an ASP (Air Stabilized Platform)
[PB80-221997] N81-14183

OIL RECOVERY
Improved polymers for enhanced oil recovery synthesis and rheology
[DOE/BETC-5603/10] N81-14089
Recycled program: Phase 1-Test procedures for recycled oil used as burned fuel
[PB80-215536] N81-14133
Systematic study of metal ion sorption on selected geologic media --- tracers for oil recovery systems
[DOE/BETC/OR-14] N81-14545

OIL SLICKS
A multifrequency evaluation of active and passive microwave sensors for oil spill detection and assessment N81-14152

OILS
Production of optically thin free-standing oil films from the edge of a rotating disc --- liquid foils for ion accelerators
[DOE/ER-01388/457] N81-14840

OLEIC ACID
Analysis of explosive composite RX-14-AE (HMX/polythylene/oleic acid)
[UCID-18785] N81-14132

ONBOARD EQUIPMENT
Survey of Workshops on Meteorological and Environmental Inputs to Aviation Systems N81-14556
Icing instrumentation N81-14559
Winds and wind shear in-situ sensors N81-14563

OPERATING SYSTEMS (COMPUTERS)
Recurrent ultracomputers are not log n-fast
[MC-IW-118/79] N81-14627
A parallel processing operating system for the multiprocessor SEM
[ISS-T-79/11] N81-14632
A guide to the theory of gear's method for the numerical solution of systems of stiff ordinary differential equations
[NPL-DNACS-29/80] N81-14741

OPERATIONAL PROBLEMS
Urban waste conversion systems --- operational problems and marketing
[DSE-5580-T1] N81-14931

OPERATIONS RESEARCH
Linear programming and undiscounted stochastic games in which one player controls transitions
[MC-BW-122/80] N81-14777
Duality and the nonlinear roundtrip alpha center and covering problems on a tree
[MC-BW-123/80] N81-14778
Hierarchial distribution modeling with routing costs
[MC-BW-117/80] N81-14780
Analytical evaluation of hierarchial planning systems
[MC-BW-118/80] N81-14781

OPERATORS (MATHEMATICS)
Volterra integral equations and semigroups of operators
[MC-TW-197/80] N81-14740
The determination of seasonal ARMA models
[AD-A091516] N81-14784

OPTICAL COMMUNICATION
Stragetic laser communications program. Volume 1: Proceedings of the Navy/DARPA Fourth Technical Interchange Meeting
[AD-A091619] N81-14201
Dye lasers. Citations from the NTIS data base
[PB80-813801] N81-14312

OPTICAL EQUIPMENT
A grainless focusing screen for cameras, microscopes and other optical instruments
[TDB-347] N81-14834
The faint object camera for the space telescope
[ESA-SP-1028] N81-14937

OPTICAL MEASUREMENT
Estimation on the Wettzell coordinates from satellite laser ranging at Kootwijk, San Fernando and Wettzell
[VTH-LR-296] N81-14373

OPTICAL MEASURING INSTRUMENTS
Extended applicability of optical wind sensing techniques
[AD-A091606] N81-14582
OPTICAL PROPERTIES
Electronic and optical properties and modeling of intercalated graphite
[AD-A091858] N81-14009
The development of fluorides for high power laser optics
[DOE/DP-40020/1] N81-14839
Production of optically thin free-standing oil films from the edge of a rotating disc --- liquid foils for ion accelerators
[DOE/ER-01388/457] N81-14840
OPTICAL PUMPING
Neodymium YAG lasers. Citations from the International Aerospace Abstracts data base
[NASA-CR-163835] N81-14316
OPTICAL RADAR
Lidar observations at 0.7-micrometers and 10.6 micrometers wavelengths during smoke week 2
[AD-A091561] N81-14382
Development of an airborne lidar for characterizing particle distribution in the atmosphere
[EPRI-EA-1538] N81-14514
Surface based remote sensing in marine air. Extensive analysis of echoes by several sensors reveals evolutionary atmospheric processes related to weather capable of affecting naval operations
[AD-A091518] N81-14584
OPTICAL REFLECTION
Photovoltaic mechanisms in polycrystalline thin-film silicon solar cells
[DOE/ET-23108/3] N81-14442
OPTICAL RESONATORS
X-ray lasers. Citations from the International Aerospace Abstracts data base
[NASA-CR-163834] N81-14315
OPTIMAL CONTROL
Extension of proportional navigation by use of optimal filtering and control methods
[DFVLR-FB-80-10] N81-13943
Optimal control nonlinear programming, spline interpolation, numerical software
[DFVLR-MITT-80-03] N81-14681
On a class of nearly singular optimal control problems
[MC-TW-196/80] N81-14683
On a class of optimal control problems with an almost cost free solution
[MC-TW-204/80] N81-14684
OPTIMIZATION
Computational aerodynamic design tools and techniques used at fighter development
[MBB-FE-122/S/PUB/13] N81-13950
Fundamentals of conceptual design optimization of subsonic transport aircraft
[VTH-LR-292] N81-13951
Economic evaluation of flying-qualities design criteria for a transport configured with relaxed static stability
[NASA-TP-1760] N81-13968
Application of vector performance optimization to a robust control loop design for a fighter aircraft
[DFVLR-FB-80-14] N81-13970
Dual methods and approximation concepts in structural synthesis
[NASA-CR-3226] N81-14347
Steepest edge algorithms in linear and nonlinear programming
[AD-A091608] N81-14662
Performed evaluation of unconstrained optimization techniques
[DFVLR-MITT-79-21] N81-14680
A recursive approach to the implementation of enumerative methods
[MC-BW-116/80] N81-14728
Improving the accuracy of computed matrix eigenvalues
[ANL-80-84] N81-14761
Profit maximization models for exponential decay processes
[AD-A091522] N81-14768
ORBIT CALCULATION
Numerical aspects of orbit computation using series of kernel functions
[SER-A-89-MITT-155] N81-13980
An analytical generator for drag-free satellite orbits
[RAE-TR-80085] N81-13981
Determination of the primary specular point in the sunglint pattern of a polar-orbiting satellite image
[AD-A091664] N81-13989
Automatic detection and treatment of oscillatory and/or stiff ordinary differential equations
[COO-2383-0068] N81-14759
ORBIT DECAY
Skylab orbital lifetime prediction and decay analysis
[NASA-TM-78308] N81-13979
ORBITAL MECHANICS
Skylab orbital lifetime prediction and decay analysis
[NASA-TM-78308] N81-13979
Numerical aspects of orbit computation using series of kernel functions
[SER-A-89-MITT-155] N81-13980
An analytical generator for drag-free satellite orbits
[RAE-TR-80085] N81-13981
ORGANIC COMPOUNDS
Organic compounds in the exhaust of a J85-5 turbine engine
[AD-A091712] N81-13966
An analytical chemical system for the determination of heavy metals and organic compounds
[DOE/EV-04320/3] N81-14046
Bibliography of fluid density: Experimental determinations on single substances over a temperature range exceeding 40 K
[NPL-CHEM-106] N81-14264
Role of Organic Soils in the World Carbon: Problem Analysis and Research Needs
[DOE/EV-10040/2] N81-14516
ORGANIC WASTES (FUEL CONVERSION)
Urban waste conversion systems --- operational problems and marketing
[DSE-5580-T1] N81-14931
ORIFICES
Evaluation of orifice meter recorder measurement errors in lower and upper capacity ranges
[DOE/BC-10025/18] N81-14295
ORR-SOMMERFELD EQUATIONS
Free-stream disturbances, continuous eigenfunctions, boundary-layer instability and transition
[NASA-CR-163828] N81-14266
Linear mode conversion in a toroidal plasma
[TRITA-PFU-80-06] N81-14855
ORTHOGONAL FUNCTIONS
Numerical generation of two-dimensional orthogonal curvilinear coordinates in an Euclidean space N81-14726
Rapid calculation of sin(x)
[FOA-C-10150-M8] N81-14749
A general method of approximation particulary in L2
[FOA-C-10158-M8] N81-14750
ORTHOGONALITY
Generations of orthogonal surface coordinates N81-14700
Generation of orthogonal boundary-fitted coordinate systems N81-14703
Boundary-fitted coordinates for regions with highly curved boundaries and reentrant boundaries N81-14709
A simple numerical orthogonal coordinate generator for fluid dynamic applications N81-14710
A note on Kronecker products and related norms
[TRITA-NA-8001] N81-14783
OSCILLATING FLOW
A laser Doppler velocimeter for pulsatile water flow measurements in resonant hydraulic circuits
[CISE-1521] N81-14269
OSCILLATIONS
Investigation of a transonic flow oscillation by real-time laser Doppler anemometry
[DFVLR-FB-80-04] N81-13924
OSCILLATORS
Chaotically transitional phenomena in the forced negative-resistance oscillator --- systems simulation
[IJP-482] N81-14842
OSMIUM ISOTOPES
Determination of neutron cross sections and resonance parameters for the osmium isotopes 186, 187, and 188, Tl-205, S-32, the stable tellurium isotopes and of the 82 keV inelastic cross section for U-238
[DOE/ER-02696/9] N81-14809
OUTGASSING
Outgassing tests on iras solar panel samples N81-14156
The identification of trends in outgassing technology N81-14160
OXIDATION
Bromine as a partial oxidant. Oxidation state and charge transport in brominated nickel and palladium bisdiphenylglyoximates: A comparison with the ionidated materials and resonance Raman structure spectra correlations for polybromides
[AD-A091534] N81-14037
Passivation of silicon power devices by thermal oxidation
[BMFT-FB-T-79-48] N81-14401
OXIDE FILMS
Large scale integrated MOS-circuits with narrow structures: Artworks and masks
[BMFT-FB-T-79-104] N81-14233
Electrochromic displays
[BMFT-FB-T-79-108] N81-14234
Imaging of surfaces and defects of crystals
[DOE/ER-02995/4] N81-14903
OXIDES
Plastic deformation in oxide ceramics
[DOE/ER-04217/T1] N81-14091
OXYGEN
A survey of concepts/techniques for sensing oxygen in aircraft oxygen-generating systems
[AD-A091667] N81-14038
OXYGEN METABOLISM
Metabolic rate measurement system
[NASA-CR-160893] N81-14614
OXYGEN PLASMA
Wave propagation in a deuterium-hydrogen-oxygen plasma in the range of ion cyclotron frequencies
[IPF-80-5] N81-14853
OZONE
A new tropopause definition from simultaneous ozone temperature profiles
[AD-A091718] N81-14543

P

PACIFIC OCEAN
The Eastern Pacific Tropical Cyclone Strike Probability Program (EPSTRKP)
[AD-A091841] N81-14579
Internal tides and inertial oscillations as inferred from current and temperature measurements in the equatorial Pacific
[PB80-225568] N81-14603
PANELS
Structural wood panels with improved fire resistance
[NASA-CASE-ARC-11174-1] N81-13999
Solar panel thermal cycling testing by solar simulation and infrared radiation methods N81-14164
PARABOLIC DIFFERENTIAL EQUATIONS
On the economization of stabilized Runge-Kutta methods with applications to parabolic initial value problems
[MC-NW-74/79] N81-14731
On a class of explicit three-step Runge-Kutta methods with extended real stability intervals
[MC-NW-77/79] N81-14734
Stability and bifurcation in a parabolic equation
[AD-A091645] N81-14753
PARABOLIC REFLECTORS
Annular solar receiver thermal characteristics
[SAND-79-1010] N81-14410
Development of sheet molding compound solar collectors with molded-in silvered glass reflective surfaces
[SAND-80-0702C] N81-14411
PARADOXES
A note on Zeno's paradox in quantom theory
[DOE/ER-03992/387] N81-14909
PARALLEL COMPUTERS
A parallel processing operating system for the multiprocessor SEM
[ISS-T-79/11] N81-14632
PARALLEL PROCESSING (COMPUTERS)
Bitonic sort on ultracomputers
[MC-IW-117/79] N81-14626
Recurrent ultracomputers are not log n-fast
[MC-IW-118/79] N81-14627
A parallel processing operating system for the multiprocessor SEM
[ISS-T-79/11] N81-14632

PARALLEL PROGRAMMING
An overview of a minicomputer network
[SAND-80-0821] N81-14678
PARAMETER IDENTIFICATION
Theoretical investigation of the influence of spoiler dynamics on the handling qualities of an aircraft with direct lift control
[DFVLR-FB-80-07] N81-13975
Recycled program: Phase 1-Test procedures for recycled oil used as burned fuel
[PB80-215536] N81-14133
PARAMETERIZATION
Economic evaluation of flying-qualities design criteria for a transport configured with relaxed static stability
[NASA-TP-1760] N81-13968
PARTIAL DIFFERENTIAL EQUATIONS
Numerical solution of an advection-diffusion equation for a dissolved species in a pulsating crack
[NPL-DNACS-28/80] N81-14025
Numerical grid generation techniques --- conference
[NASA-CP-2166] N81-14690
Grid generation using differential systems techniques N81-14692
Mesh generation using algebraic techniques N81-14693
Grid generation for time dependent problems: Criteria and methods N81-14699
Nonlinear grid error effects on numerical solution of partial differential equations N81-14704
Use of hyperbolic partial differential equations to generate body fitted coordinates N81-14723
A precise definition of separation of variables
[MC-TW-194/79] N81-14738
Numerical methods for initial value problems
[AD-A091502] N81-14754
PARTICLE ACCELERATION
Three-dimensional space-charge calculation method
[LA-8531-MS] N81-14831
PARTICLE ACCELERATORS
Superconducting magnets. Citations from NTIS data base
[PB80-816028] N81-14262
Space Experiments with Particle Accelerators (SEPAC), status review, 23 September 1980 N81-14951
PARTICLE COLLISIONS
Thermodynamic interpretation of multiparticle emission in relativistic heavy ion collisions
[DOE/ER-03992/388] N81-14812
PARTICLE DENSITY (CONCENTRATION)
Development of an airborne lidar for characterizing particle distribution in the atmosphere
[EPRI-EA-1538] N81-14514
Mixing length hypothesis in the dissipative trapped ion instability
[IPPJ-481] N81-14849
PARTICLE EMISSION
Thermodynamic interpretation of multiparticle emission in relativistic heavy ion collisions
[DOE/ER-03992/388] N81-14812
PARTICLE INTERACTIONS
Water-deuterium oxide exchange in polymers used in spacecraft applications --- outgassing from Mylar and Kapton N81-14159
Pion interactions at medium energies
[DOE/ER-03948/12] N81-14814
PARTICLE PRECIPITATION
Automated emergency meteorological response system
[DP-MS-80-81] N81-14592
PARTICLE PRODUCTION
Evaluation of photon production data from neutron-induced reactions
[CONF-800979-1] N81-14819
PARTICLE SIZE DISTRIBUTION
The effect of soiling on solar mirrors and techniques used to maintain high reflectivity
[SAND-79-2422] N81-14415
PARTICLE SPIN
Analysis of spectral diffusion of localized triplet spin transitions within an inhomogeneous profile
[AD-A091714] N81-14033
Muon spin rotation research program
[NASA-CR-163829] N81-14801
PARTICLE THEORY
Prospects for supergravity
[FERMILAB-CONF-80/74-THY] N81-14549
PASCAL (PROGRAMMING LANGUAGE)
Automation of a maintainability prediction
[AD-A091787] N81-14339
A PASCAL processor validation suite
[NPL-CSU-7/80] N81-14654
PASSIVITY
Passivation of silicon power devices by thermal oxidation
[BMFT-FB-T-79-48] N81-14401
PATENT POLICY
Documentation of and information on protective rights relating to government support on technological research and development
[BMFT-FB-T-79-186] N81-14918
PATTERN RECOGNITION
Feature tagging
[AD-A091691] N81-14378
Analysis and development of image statistics and redundancy removal
[AD-A091600] N81-14381
A unilateral representation for autoregressive random field models
[AD-A091644] N81-14664
Applications of the Fast Fourier Transform. Citations from the NTIS data base
[PB80-815491] N81-14677
Three dimensional digital technology
[AD-A091045] N81-14688
PAVEMENTS
Sealing joints and cracks, thin resurfacing, and locating voids under concrete slabs
[PB80-215635] N81-14182
PDP COMPUTERS
RSTS/E communications link via an asynchronous multiplexer
[ORNL/CSD/TM-128] N81-14670
PENETRATION
Fire extinguishing apparatus having a slidable mass for a penetrator nozzle --- for penetrating aircraft and shuttle orbiter skin
[NASA-CASE-KSC-11064-1] N81-14137
PERFORMANCE
Performance of a flight qualified, thermoelectrically temperature controlled QCM sensor with power supply, thermal controller and signal processor N81-14158
PERFORMANCE PREDICTION
Efficient utilization of alternate fuels: Development of models for the prediction of interchangeability, design, and performance of gas burner/combustor systems
[PB80-218282] N81-14134
PERFORMANCE TESTS
Research and development of control actuation systems for aircraft. Volume 2. The evaluation of a force sharing and an active on-line fly-by-wire actuation system
[AD-A091559] N81-13976
Test and evaluation of an Energetics Science Incorporated Model 7660 electrochemical hydrazines analyzer
[AD-A091710] N81-14035
Comprehensive testing of a defense systems communications satellite N81-14139
Effectiveness of spacecraft testing programs N81-14140
R. F. testing of the third generation defense communication satellite N81-14141
Primary calibrations of critical flow venturi nozzles in high-pressure gas
[NEL-666] N81-14270
Regenerative flywheel energy storage system. Volume 1: Executive summary
[UCRL-15290-VOL-1] N81-14484
Development of a low-cost black-liquid solar collector, phase 2
[DOE/CS-30171/2A] N81-14492
Statistical relationship between median visibility and conditions of worstcase manmade impact on visibility
[LA-UR-80-2485] N81-14550
Ultrasonic cleaner evaluation
[GEPP-TIS-526] N81-14800
PERIODIC VARIATIONS
Site insolation and wind power characteristics
[DOE/CS-20160/01-VOL-1] N81-14546
PERIPHERAL JET FLOW
Downwash calculation at close range behind a trapezoidal wing in supersonic flow
[FFA-TN-AU-1661] N81-13925
PERMAFROST
Seasat views North America, the Caribbean, and Western Europe with imaging radar
[NASA-CR-163825] N81-14372
PERMEABILITY
Development of soft magnetic materials with special properties
[BMFT-FB-T-79-32] N81-13996
PERSONNEL
Automated medical information system of the Los Alamos Scientific Laboratory
[LA-UR-80-2160] N81-14621
PERSONNEL MANAGEMENT
The solution of manpower planning problems by the forward simplex method
[AD-A091521] N81-14916
PERTURBATION
On a class of nearly singular optimal control problems
[MC-TW-196/80] N81-14683
PERTURBATION THEORY
Numerical aspects of orbit computation using series of kernel functions
[SER-A-89-MITT-155] N81-13980
An adaptive computation mesh for the solution of singular perturbation problems N81-14701
How many jumps? Variational characterization of the limit solution of a singular perturbation problem
[MC-TW-195/79] N81-14739
Tokamak currents driven by weak electrostatic waves
[DOE/ET-53036/18] N81-14880
PHASE LOCKED SYSTEMS
Frequency translating phase conjugation circuit for active retrodirective antenna array --- microwave transmission
[NASA-CASE-NPO-14536-1] N81-14185
PHASE TRANSFORMATIONS
Problem of phase transitions in nuclear structure
[BNL-28357] N81-13998
Determination of phase transformation temperatures of titanium-nickel using differential thermal analysis
[AD-A091792] N81-14062
Phase-equilibria for design of coal gasification processes. Dew points of hot gases containing condensible tars
[DOE/ET-10603/T1] N81-14120
Heat transfer modeling for a non-fluidized particulate bed
[EGG/ENI-143] N81-14910
PHASED ARRAYS
Coaxial phased array antenna
[NASA-CASE-MSC-16800-1] N81-14187
AEGIS Near-field antenna test system, automated test system for phased array antennas
[AD-A091697] N81-14199
Error sources applicable to precision trajectory radar calibration
[AD-A091654] N81-14204
PHENOLIC RESINS
Heatshield material selection for advanced ballistic reentry vehicles --- rayon fiber cloth impregnated with phenolic resin N81-14169
PHENYLS
The chemistry of energetic fragments
[AD-A091823] N81-14031
PHOSPHORUS
Determination of atmospheric phosphorous addition to Lake Michigan
[PB80-219124] N81-14385
Homogeneous phosphorus of silicon by neutron transmutation
[BMFT-FB-T-79-52] N81-14898
PHOTOACOUSTIC SPECTROSCOPY
Laser-photoacoustic detection of water pollutants, phase 1
[PB80-222250] N81-14524
PHOTOCHEMICAL REACTIONS
Chemical kinetic and photochemical data sheets for atmospheric reactions
[AD-A091631] N81-14541
PHOTOCHROMISM
Electrochromic glasses
[AD-A091641] N81-14088
PHOTOELECTRIC EMISSION
Quasi elastic light scattering from macromolecules in solution
[CISE-1528] N81-14083

PHOTOELECTRON SPECTROSCOPY
An X-ray photoelectron spectroscopic examination of surfaces of some thermosetting resins and carbon fibre composites
[RAE-TM-MAT-347] N81-14007
Photoelectron photoion molecular beam spectroscopy
[LBL-11434] N81-14820
PHOTOGEOLOGY
Seasat views North America, the Caribbean, and Western Europe with imaging radar
[NASA-CR-163825] N81-14372
PHOTOGRAMMETRY
Survey of CIG data base generation from imagery
[AD-A091508] N81-14923
PHOTOGRAPHIC PLATES
A grainless focusing screen for cameras, microscopes and other optical instruments
[TDB-347] N81-14834
PHOTOIONIZATION
Photoelectron photoion molecular beam spectroscopy
[LBL-11434] N81-14820
PHOTOLITHOGRAPHY
Novel production method for high-voltage semiconductor devices with greatest possible economy
[BMFT-FT-T-79-126] N81-14236
PHOTOMETERS
Atmospheric Emission Photometric Imaging on Spacelab (AEPI) N81-14946
PHOTON-ELECTRON INTERACTION
Quasi elastic light scattering from macromolecules in solution
[CISE-1528] N81-14083
PHOTONS
Diffractive photon dissociation on hydrogen (Fermilab Experiment 612)
[DOE/ER-02232/87] N81-14808
Evaluation of photon production data from neutron-induced reactions
[CONF-800979-1] N81-14819
PHOTOPRODUCTION
Photoproduction of hydrogen by membranes of green photosynthetic bacteria
[BNL-28334] N81-14129
PHOTOSYNTHESIS
Photoproduction of hydrogen by membranes of green photosynthetic bacteria
[BNL-28334] N81-14129
Photochemistry and enzymology of photosynthesis
[DOE/ER-03326/90] N81-14607
PHOTOTHERMAL CONVERSION
Applicability of advanced automotive heat engines to solar thermal power
[NASA-TM-81658] N81-14397
PHOTOVOLTAIC CELLS
Design and fabrication of terrestrial, photovoltaic solar generators for field testing in regions of intensive insolation
[BMFT-FB-T-79-34] N81-14400
Regional conceptual design and analysis studies for residential photovoltaic systems, volume 2
[SAND-78-7040/2] N81-14416
Solar photovoltaic/thermal residential experiment, phase 1
[DOE/ET-20279/103] N81-14437
Electrodeposition of polycrystalline and amorphous silicon for photovoltaic applications
[DOE/ET-23046/3] N81-14443
Quality-assurance needs and goals in solar energy conversion
[SERI/TP-641-773] N81-14483
Six kilowatt, residential photovoltaic power systems study; design, performance, economics, market potential
[UCID-18776] N81-14487
PHOTOVOLTAIC CONVERSION
Market definition study of photovoltaic power for remote villages in developing countries
[NASA-CR-159880] N81-14391
Solar energy: Program summary document
[DOE/CS-0050] N81-14428
Photovoltaic mechanisms in polycrystalline thin-film silicon solar cells
[DOE/ET-23108/3] N81-14442
PHOTOVOLTAIC EFFECT
Photovoltaic mechanisms in polycrystalline thin film solar cells
[DOE/ET-23106/2] N81-14441
PHTHALOCYANIN
Strategies for control of lattice architecture in low-dimensional molecular metals: Assembly of partially oxidized face-to-face linked arrays of metallomacrocycles
[AD-A091535] N81-14900
PILOT PERFORMANCE
Evaluation of a computer-generated perspective tunnel display for flight path following
[NASA-TP-1736] N81-13958
A literature study on visual motion accuity (minimum perceptible movement)
[DFVLR-MITT-80-06] N81-14618
Stress factors on pilot performance. Citations from the International Aerospace Abstracts data base
[NASA-CR-163836] N81-14623
Human factors problems in general aviation
[AD-A091670] N81-14625
PIONS
Thermodynamic interpretation of multiparticle emission in relativistic heavy ion collisions
[DOE/ER-03992/388] N81-14812
Pion interactions at medium energies
[DOE/ER-03948/12] N81-14814
PIPE FLOW
An investigation of turbulent wall-pressure fluctuations in a pipe downstream of an abrupt enlargement of its cross-sectional area
[DFVLR-FB-80-11] N81-14273
PIPES (TUBES)
Ceramic heat pipe development
[DOE/TIC-11293] N81-14279
Production technology of beta-alumina ceramics for Na/S batteries
[BMFT-FB-T-79-57] N81-14402
Solar central receiver hybrid power system, phase 1. Volume 3: Appendices
[DOE/ET-21038/1-VOL-3] N81-14418
PISTON ENGINES
Advanced Technology Spark-Ignition Aircraft Piston Engine Design Study
[NASA-CR-165162] N81-13963
PISTONS
On the improvement of miniature pyrotechnic devices for space application
[ESA-CR(P)-1296] N81-14105
Power control for hot gas engines
[NASA-CASE-NPO-14220-1] N81-14318
PITCH (INCLINATION)
Landing flying qualities evaluation criteria for augmented aircraft
[NASA-CR-163097] N81-13969
PLANAR STRUCTURES
Mass synthesis for multiple balancing criteria of complex, planar mechanisms N81-14321
PLANETARY COMPOSITION
Theoretical investigation of lunar and planetary interiors
[NASA-CR-163822] N81-14365
PLANETARY EVOLUTION
Hotspots, basalts and the evolution of the mantle N81-14368
PLANKTON
Global temperature patterns 6000 years ago
[DOE/EV-100097/1] N81-14591
Phytoplankton composition and abundance in Southern Lake Huron
[PB80-216013] N81-14610
PLANTS (BOTANY)
Photochemistry and enzymology of photosynthesis
[DOE/ER-03326/90] N81-14607
PLASMA CLOUDS
Coordinated ionospheric and magnetospheric observations from the ISIS 2 satellite by the ISIS 2 experimenters. Volume 3: High-latitude charged particle, magnetic field, and ionospheric plasma observations during northern summer
[NASA-TM-82223] N81-14532
Fragmentation in rotating isothermal protostellar clouds
[NASA-TM-82229] N81-14938
PLASMA COMPOSITION
Coordinated ionospheric and magnetospheric observations from the ISIS 2 satellite by the ISIS 2 experimenters. Volume 3: High-latitude charged particle, magnetic field, and ionospheric plasma observations during northern summer
[NASA-TM-82223] N81-14532
PLASMA CONTROL
Ion dynamics and the unified tearing mode
[DOE/ET-53036/23] N81-14817
Confinement and heating of plasmas
[ISSN-0547-1567] N81-14848
On plasma equilibrium in a poloidal magnetic field
[TRITA-PFU-80-03] N81-14863
Plasma stabilization experiment --- trapping cold ions
[DOE/ET-53087/2] N81-14876
Most probable ideal magnetohydrodynamic equilibria. 2: Reversed field pinch regime
[DOE/ET-53045/2] N81-14878
Instrumentation and controls of an ignited Tokamak
[ORNL/TM-7153] N81-14885
Equilibrium field coils for the Engineering Test Facility: Shaping the plasma cross section
[ORNL/TM-7339] N81-14886
Electron heating and confinement measurements in EBT-S using Thompson scattering
[ORNL/TM-7437] N81-14887
Model for ion confinement in a hot-electron tandem mirror anchor
[UCID-18802] N81-14894
PLASMA CURRENTS
RMF concept: A rotating-magnetic-field technique for driving steady plasma currents in Compact Toroid devices
[LA-8516-MS] N81-14884
Currents induced in Tokamaks by electron cyclotron heating
[ORNL/TM-7503] N81-14888
Disruptive shift of magnetic axis noncircular Tokamaks
[PPPL-1707] N81-14889
PLASMA DENSITY
Numerical simulation of density evolution in JIPP T-2 Tokamak
[IPPJ-483] N81-14841
PLASMA DIAGNOSTICS
Design study for the JET diagnostic systems Quasi-Continuous Laser Scattering --- joint European Tokamak
[IPF-80-2] N81-14298
Time resolved Thomson scattering using a periodically emitting ruby laser --- for plasma diagnostics
[IPF-80-4] N81-14299
Heavy ion beam probing
[DOE/ET-53004/2] N81-14822
Supplementary investigations to fundamental research program plasma techniques --- SF6 flow in a double nozzle circuit breaker model
[BMFT-FB-T-79-43] N81-14854
Rocket measurements of electric fields, electron density and temperature during the three phases of auroral substorms
[TRITA-EPP-79-22] N81-14859
The measurement of the ion energy distribution and the hot ion density decay in torturi
[REPT-80-122] N81-14868
A Recoverable Plasma Diagnostics Package (RPDP) for Spacelab N81-14956
PLASMA ENGINES
Development of a high energy density capacitor for plasma thrusters
[AD-A091839] N81-13995
PLASMA EQUILIBRIUM
On plasma equilibrium in a poloidal magnetic field
[TRITA-PFU-80-03] N81-14863
The ballooning mode second stability region for sequences of Tokamak equilibria
[DOE/ET-53073/T1] N81-14869
Stability analysis of cylindrical Vlasov equilibria
[DOE/ET-53051/113] N81-14895
PLASMA FREQUENCIES
Properties of a fluctuating double layer in a magnetized plasma column
[TRITA-EPP-80-02] N81-14860
PLASMA HEATING
Confinement and heating of plasmas
[ISSN-0547-1567] N81-14848
Some necessary parameters for a critical velocity interaction between the ionospheric plasma and a Xenon cloud
[TRITA-EPP-79-20] N81-14857
The measurement of the ion energy distribution and the hot ion density decay in torturi
[REPT-80-122] N81-14868

Microwave heating of the ELMO bumpy torus relativistic electron ring
[DOE/ER-53092/13] N81-14874

Electron heating and confinement measurements in EBT-S using Thompson scattering
[ORNL/TM-7437] N81-14887

PLASMA INTERACTIONS

Some necessary parameters for a critical velocity interaction between the ionospheric plasma and a Xenon cloud
[TRITA-EPP-79-20] N81-14857

PLASMA JETS

Helium-jet coupled mass separator: Advances and directions
[CONF-800870-1] N81-14047

Supplementary investigations to fundamental research program plasma techniques --- SF6 flow in a double nozzle circuit breaker model
[BMFT-FB-T-79-43] N81-14854

An experimental study of unipolar arcs in a low pressure mercury discharge
[DOE/ET-51010/8] N81-14871

PLASMA LAYERS

Electrostatic double layers and a plasma evacuation process
[TRITA-EPP-79-21] N81-14858

Properties of a fluctuating double layer in a magnetized plasma column
[TRITA-EPP-80-02] N81-14860

Studies of electrostatic double layers with applications to cosmic plasmas
[TRITA-EPP-80-03] N81-14861

PLASMA PHYSICS

Critical ionization velocity effects in astrophysical plasmas
[TRITA-EPP-79-14] N81-14856

Compact Toroid Theory Planning Workshop
[DOE/ER-0062] N81-14873

Experiments in the ISX-B Tokamak: ECRH ripple studies, pellet fueling, impurity flow reversal, and surface physics
[IAEA-CN-38/A-5] N81-14882

Plasma Physics of Intense Neutral Beam heating in Tokamaks
[CONF-790463-2] N81-14890

Numerical solution of initial-value problems in plasma physics --- fusion research
[UCRL-85033] N81-14891

Enhanced interaction of the solar wind and the interstellar neutral gas by virtue of a critical velocity effect
[TRITA-EPP-79-19] N81-14942

Spacelab experiment: ALAE, Atmospheric Lyman-Alpha Emissions N81-14945

TEBPP: Theoretical and Experimental study of Beam-Plasma-Physics N81-14952

Magnetospheric multiprobes: Investigations and instrumentation N81-14955

Tether facility presentation N81-14958

PLASMA RADIATION

X-ray lasers. Citations from the International Aerospace Abstracts data base
[NASA-CR-163834] N81-14315

PLASMA RESONANCE

Experiment on magnetoacoustic mode excitation in FIVA device
[TRITA-PFU-80-08] N81-14867

PLASMA SLABS

Ion dynamics and the unified tearing mode
[DOE/ET-53036/23] N81-14817

Magnetoacoustic mode coupling to excitation structures
[TRITA-PFU-80-07] N81-14866

PLASMA TEMPERATURE

The effects of radiating impurities and Boehm transport in a cool plasma mantle
[TRITA-PFU-80-05] N81-14865

PLASMA TURBULENCE

Mixing length hypothesis in the dissipative trapped ion instability
[IPPJ-481] N81-14849

PLASMA WAVES

Investigation of surface plasmon dispersion
[AD-A091853] N81-14870

Waves In Space Plasmas (WISP)
[WISP-336] N81-14953

The WISP/HF system for Spacelab N81-14954

PLASMA-ELECTROMAGNETIC INTERACTION

Relation between weibel instability and magnetic field generating thermal instability
[IPPJ-485] N81-14843

Wave propagation in a deuterium-hydrogen-oxygen plasma in the range of ion cyclotron frequencies
[IPF-80-5] N81-14853

Properties of a fluctuating double layer in a magnetized plasma column
[TRITA-EPP-80-02] N81-14860

On the energy principle for plasma MHD stability in presence of an inhomogeneous magnetic vacuum field
[TRITA-PFU-80-04] N81-14864

PLASMAS (PHYSICS)

A computer simulation on microinstabilities and anomalous resistivity near the magnetic neutral sheet
[IJJP-487] N81-14845

On a new series of integrable nonlinear evolution equations
[IPPJ-484] N81-14846

Cross sections for charge transfer collisions involving hydrogen atoms --- fusion plasmas
[IPPJ-AM-15] N81-14847

The effects of radiating impurities and Boehm transport in a cool plasma mantle
[TRITA-PFU-80-05] N81-14865

Experiment on magnetoacoustic mode excitation in FIVA device
[TRITA-PFU-80-08] N81-14867

Space plasma physics active experiments
[NASA-CP-2165] N81-14944

PLASMONS

Investigation of surface plasmon dispersion
[AD-A091853] N81-14870

PLASTIC DEFORMATION

Plastic deformation in oxide ceramics
[DOE/ER-04217/T1] N81-14091

PLASTIC PROPERTIES

J-integral elastic plastic fracture mechanics evaluation of the stability of cracks in nuclear reactor pressure vessels
[SAND-80-0688] N81-14357

PLASTICS

Development of a low-cost black-liquid solar collector, phase 2
[DOE/CS-30171/2A] N81-14492

PLATES (STRUCTURAL MEMBERS)

Refined theory for bending of perforated plates
[WTHD-125] N81-14352

PLATINUM

Recent advances in Pt coating of microspheres by a batch magnetron sputtering process
[UCRL-84478] N81-14074

NMR of small platinum particles
[DOE/ER-01198/1324] N81-14824

PLENUM CHAMBERS

Micro-fluid exchange coupling apparatus
[NASA-CASE-ARC-11114-1] N81-14605

PLOTTING

S2KPLOT/DOEPLOT, implementation and programmers manual
[PB80-219926] N81-14671

S2KPLOT version 3.0, user's manual
[PB80-219934] N81-14674

PLUMES

Numerical solutions of the Navier-Stokes equations for transonic afterbody flows
[NASA-TP-1784] N81-13919

Analytical model for a vertical buoyant jet
[ORNL/TM-7140] N81-14513

Development of an airborne lidar for characterizing particle distribution in the atmosphere
[EPRI-EA-1538] N81-14514

POINTING CONTROL SYSTEMS

Handbook of satellite pointing errors and their statistical treatment
[ESS/SS-997] N81-13985

Satellite Power System (SPS) antenna pointing control
[NASA-CR-3350] N81-14392

POINTS (MATHEMATICS)

A note on C(O) Galerkin methods for two point boundary problems
[MC-NW-73/79] N81-14730

POISSON EQUATION

Generation of orthogonal boundary-fitted coordinate systems N81-14703

Numerical generation of two-dimensional grids by the use of Poisson equations with grid control at boundaries N81-14722

Three-dimensional space-charge calculation method
[LA-8531-MS] N81-14831

POLAR CAPS

Occurrences of the polar slant E condition (SEC) at Marssarssuaq, Godhavn, Thule, 1978
[ISBN-87-7478-165-0] N81-14537

POLAR ORBITS

System techniques, satellites, orbit design, thermal control, power supply, attitude control, telemetry system
[DFVLR-FB-79-37] N81-13984

Determination of the primary specular point in the sunglint pattern of a polar-orbiting satellite image
[AD-A091664] N81-13989

POLARIZATION CHARACTERISTICS

Horn antenna design studies. Citations from the International Aerospace Abstract data base
[NASA-CR-163820] N81-14219

POLARIZED ELECTROMAGNETIC RADIATION

Coaxial phased array antenna
[NASA-CASE-MSC-16800-1] N81-14187

POLICIES

Earth resources
[FOA-C-10148-M3] N81-14375

POLLUTION

Global energy futures and the carbon dioxide problem N81-14502

POLLUTION CONTROL

Development of a simple fluidized-bed coal combustion model for the assessment of a pressurized fluidized-bed combustion system for electrical power generation
[DOE/METC/SP-80/15] N81-14044

Support studies in fluidized-bed combustion
[PB80-218613] N81-14056

An evaluation of emission factors for waste-to-energy systems
[PB80-226665] N81-14521

Maneuvering aircraft: Noise pollution and control. Citations from the NTIS data base
[PB80-815566] N81-14525

Urban air pollution. Citations from the NTIS data base
[PB80-814411] N81-14526

POLLUTION MONITORING

Determination of atmospheric phosphorous addition to Lake Michigan
[PB80-219124] N81-14385

Remote sensing applied to pollution monitoring. Citations from the International Aerospace Abstracts data base
[NASA-CR-163830] N81-14388

Monitoring pollutant gases from space using passive microwave techniques --- lowest layer of the troposphere
[NPL-QU-59] N81-14505

Development of an airborne lidar for characterizing particle distribution in the atmosphere
[EPRI-EA-1538] N81-14514

Misspecification of trend in spatial random function interpolation with application to oxidant mapping
[DOE/EV-02874/59] N81-14517

Trace metals and Stationary Conventional Combustion Processes. Volume 1: Technical report
[PB80-216161] N81-14519

A survey of acid precipitation in northern California
[PB80-225311] N81-14523

Laser-photoacoustic detection of water poliutants, phase 1
[PB80-222250] N81-14524

Automated emergency meteorological response system
[DP-MS-80-81] N81-14592

POLOIDAL FLUX

Observations of neoclassical and anomalous resistivity in toroidal discharges
[DOE/ET-53051/4] N81-14879

POLYAMIDE RESINS

Crosslinking of aromatic polyamides via pendant propargyl groups
[NASA-TM-81918] N81-14080

POLYCRYSTALS

Photovoltaic mechanisms in polycrystalline thin film solar cells
[DOE/ET-23106/2] N81-14441

Photovoltaic mechanisms in polycrystalline thin-film silicon solar cells
[DOE/ET-23108/3] N81-14442

Electrodeposition of polycrystalline and amorphous silicon for photovoltaic applications
[DOE/ET-23046/3] N81-14443

Characterization of extrinsic grain boundary dislocations and grain boundary dislocation sources by transmission electron microscopy
[DOE/AL-10887] N81-14902

POLYETHYLENES

Temperature sensitive dynamic cushioning function development and validation for aircap cellular polyethylene
[AD-A091604] N81-14086

Radiation-induced crosslinking and grafting reactions in polyethylene
[DOE/ER-02845/T1] N81-14090

Analysis of explosive composite RX-14-AE (HMX/polythylene/oleic acid)
[UCID-18785] N81-14132

POLYIMIDES

Method for preparing addition type polyimide prepregs
[NASA-CASE-LAR-12054-2] N81-14078

Addition polyimide end cap study
[NASA-TM-β1917] N81-14081

POLYMER CHEMISTRY

Addition polyimide end cap study
[NASA-TM-81917] N81-14081

Polymer activated catalysts
[AD-A091750] N81-14085

Improved polymers for enhanced oil recovery synthesis and rheology
[DOE/BETC-5603/10] N81-14089

Radiation-induced crosslinking and grafting reactions in polyethylene
[DOE/ER-02845/T1] N81-14090

POLYMERIC FILMS

Surface finishing
[NASA-CASE-MSC-12631-3] N81-14077

Solid lubricants. Citations from the American Petroleum Institute data base
[PB80-816010] N81-14099

Solid lubricants. Citations from the NTIS data base
[PB80-815665] N81-14100

POLYMERIZATION

Perfluoroalkyl polytriazines containing pendent iododifluoromethyl groups
[NASA-CASE-ARC-11241-1] N81-14016

Polycarboranes. Citations from the NTIS data base
[PB80-814163] N81-14136

POLYNOMIALS

Duality in polynomial models with some applications to geometric control theory
[MC-BW-115/79] N81-14682

Rapid calculation of sin(x)
[FOA-C-10150-M8] N81-14749

POLYSTYRENE

Investigation of the minimum deployment time of a foam/fabric composite material
[AD-A091658] N81-14010

POPULATION THEORY

Branching processes with continuous state space allowing immigration
[MC-SW-67/80] N81-14763

Methods in probability and statistical inference
[COO-2751-4] N81-14775

PORPHYRINS

Electron spin resonance of homozygous beta thalassemic plasma
[ISS-P-79/13] N81-14850

POSITION (LOCATION)

Determination of the primary specular point in the sunglint pattern of a polar-orbiting satellite image
[AD-A091664] N81-13989

POSITION ERRORS

Multipath induced errors, nonstatistical correction of position errors, correction of propagation anomalies
[DFVLR-MITT-79-17] N81-14188

POSITRONS

High-energy positron ionization of adsorbed species in the impulse approximation
[AD-A091748] N81-14805

POTENTIAL ENERGY

Research on alkaline zinc secondary electrodes with emphasis on model
[DOE/RL-90369/8] N81-14257

On the energy principle for plasma MHD stability in presence of an inhomogeneous magnetic vacuum field
[TRITA-PFU-80-04] N81-14864

POTENTIAL FLOW

Effect of grid system on finite element calculation N81-14715

POTENTIOMETERS (INSTRUMENTS)

Electrochemical methods of chemical analysis. Citations from the NTIS data base
[PB80-815053] N81-14057

POWDER METALLURGY

Development of high performance sintered Si3N4
[AD-A091757] N81-14008

POWER AMPLIFIERS

Fusion driver study --- pulsed lasers system for inertial confinement fusion
[DOE/DP-40006/1] N81-14872

POWER CONDITIONING

Symmetrical combiner analysis with S parameter matrices and equivalent circuits --- microwave power devices
[AD-A091784] N81-14244

POWER CONVERTERS

Investigation of the interaction between the power electric circuit and power supply systems
[BMFT-FB-T-79-115] N81-14235

POWER SPECTRA

The use of approximate expressions in power transmission spectrometry
[NPL-DES-64] N81-14024

PREAMPLIFIERS

Evaluation and assessment of low noise preamplifiers for infrared detectors
[CD.6500671] N81-14837

PRECESSION

Muon spin rotation research program
[NASA-CR-163829] N81-14801

PRECIPITATION (METEOROLOGY)

ARID zone geosystems
[AD-A091689] N81-14379

Determination of atmospheric phosphorous addition to Lake Michigan
[PB80-219124] N81-14385

Global energy futures and the carbon dioxide problem N81-14502

The chemical composition of atmospheric precipitation in Minnesota and North Dakota
[DOE/EV-04327/1] N81-14510

Solar energy meteorological research and training site, region 5
[DOE/ET-20172] N81-14590

PREDICTION ANALYSIS TECHNIQUES

Review and developments of dissemination models for airborne carbon fibers
[NASA-TM-80216] N81-14002

Propellant surveillance report, LGM-30 F and G stage 1 phase G, series 1 TP-H1011
[AD-A091765] N81-14109

The use of the principle of superposition in measuring and predicting the thermal characteristics of an electronic equipment operated in a space environment N81-14161

Service life determination for the UH-60-A (UTTAS) helicopter elastomeric bearings
[AD-A091756] N81-14324

A preliminary analysis of the audible noise of constant speed, horizontal axis wind turbine generators
[DOE/EV-0089] N81-14799

PREDICTIONS

Applications of multiconductor transmission line theory to the prediction of cable coupling: Volume 8. Prediction of cross talk involving braided shield cables
[AD-A091751] N81-14200

Automation of a maintainability prediction
[AD-A091787] N81-14339

PREPOLYMERS

Structural wood panels with improved fire resistance
[NASA-CASE-ARC-11174-1] N81-13999

PRESSING (FORMING)

Hydroforming process for pressings
[PNR-90026] N81-14172

The development of fluorides for high power laser optics
[DOE/DP-40020/1] N81-14839

PRESSURE DISTRIBUTION

Unsteady pressure distribution measurement on a rotating ellipsoid
[DFVLR-FB-80-18] N81-13927

Analysis of unsteady pressure measurements on an aerofoil section with an harmonically oscillating, slotted flap
[DFVLR-FB-80-22] N81-13929

PRESSURE EFFECTS

Derivation of the solid propellant response function
[VTH-M-366] N81-14104

PRESSURE GRADIENTS

An axisymmetric, strong-interaction procedure to include large normal pressure gradients
[AD-A091820] N81-14274

PRESSURE MEASUREMENTS

Laser-photoacoustic detection of water pollutants, phase 1
[PB80-222250] N81-14524

PRESSURE OSCILLATIONS

Analysis of unsteady pressure measurements on an aerofoil section with an harmonically oscillating, slotted flap
[DFVLR-FB-80-22] N81-13929

Air/gas system dynamics of fossil fuel power plants. Volume 3: Experimental pressure test data of a 500 MW unit and of a 125 MW unit
[EPRI-CS-1444-VOL-3] N81-14478

PRESSURE REDUCTION

Pressure harvesting of microalgae
[PB80-221781] N81-14609

PRESSURE VESSELS

Statistical evaluation of J sub c in a 533-B weld metal and heat affected zone
[TRITA-HFL-0026] N81-14323

J-integral elastic plastic fracture mechanics evaluation of the stability of cracks in nuclear reactor pressure vessels
[SAND-80-0688] N81-14357

PRESSURIZING

Pressure harvesting of microalgae
[PB80-221781] N81-14609

PRINTED CIRCUITS

Bubble memory module
[NASA-CR-3380] N81-13993

PRINTERS (DATA PROCESSING)

Communications support for flight data entry and printout terminals
[AD-A091580] N81-14202

PRISMATIC BARS

The inelastic bending of a nickel beam at several temperatures: Experiment and prediction --- prismatic bars
[DOE/ER-02733/29] N81-14362

PROBABILITY DENSITY FUNCTIONS

Measurements of fluctuating density and temperature in an axisymmetric flame
[AASU-342] N81-14028

PROBABILITY DISTRIBUTION FUNCTIONS

Approximations to the cumulative distribution function of the magnitude-squared coherence estimate
[AD-A091539] N81-14767

PROBABILITY THEORY

Some notes on the gamma function
[FOA-C-10160-M8] N81-14751

Research in algebraic manipulation
[AD-A091675] N81-14755

Methods in probability and statistical inference
[COO-2751-4] N81-14775

Most probable ideal magnetohydrodynamic equilibria? 1: Tokamak regime and quasi-force-free states
[DOE/ET-53045/1] N81-14877

PROBLEM SOLVING

Analytic solutions for thermal conduction from heat producing cylinders and spheres
[SAND-80-0039] N81-14277

Problematic features of programming languages: A situational-calculus approach. Part 1: Assignment statements
[AD-A091639] N81-14665

Problems used in testing the efficiency and accuracy of the modified Gram-Schmidt least squares algorithm
[PB80-219777] N81-14672

On a class of optimal control problems with an almost cost free solution
[MC-TW-204/80] N81-14684

Numerical grid generation techniques --- conference
[NASA-CP-2166] N81-14690
Mesh generation using algebraic techniques N81-14693
Generation of boundary and boundary-layer fitting grids N81-14694
Grid and metric generation on the assembly of locally bi-quadratic coordinate transformations N81-14698
A note on a differential system constructed by H. O. Kreiss
[TRITA-NA-8004] N81-14742
Numerical solution of initial-value problems in plasma physics --- fusion research
[UCRL-85033] N81-14891
The solution of manpower planning problems by the forward simplex method
[AD-A091521] N81-14916

PROCESS CONTROL (INDUSTRY)
Laser welding. Citations from the Engineering Index data base
[PB80-815202] N81-14335

PROCESS HEAT
Solar ponds. Citations from the Engineering Index data base
[PB80-814452] N81-14493

PROCUREMENT POLICY
Standard spacecraft procurement analysis: A case study in NASA-DoD coordination in space programs
[R-2619-RC] N81-14915

PRODUCT DEVELOPMENT
Development of a high energy density capacitor for plasma thrusters
[AD-A091839] N81-13995
Development of high performance sintered Si3N4
[AD-A091757] N81-14008
Development and demonstration of a Stirling/Rankine heat activated heat pump
[DOE/CS-20043/T1] N81-14283
Film transporting curved crystal X-ray spectrometer
[SAND-80-1286] N81-14294
Development of high-temperature turbine subsystem technology to a technology readiness status, phase 2
[FE-1806-72] N81-14332
Boron arsenide thin film solar cell development
[DOE/ET-23011/1] N81-14445
Commercialization strategy for lead/acid batteries in utility load leveling applications
[DOE/ET-26934/1] N81-14448
Regenerative flywheel energy storage system. Volume 1: Executive summary
[UCRL-15290-VOL-1] N81-14484
Six kilowatt, residential photovoltaic power systems study; design, performance, economics, market potential
[UCID-18776] N81-14487
A comparitive analysis of the Intel 8086, the Zilog Z8000 and the Motorola MC68000 microprocessors
[MC-IW-129/80] N81-14631
MHD electrode development
[DOE/ET-15529/T1] N81-14875
Standard spacecraft procurement analysis: A case study in NASA-DoD coordination in space programs
[R-2619-RC] N81-14915

PRODUCTION ENGINEERING
Manufacturing Methods and Technology (MM/T) project to establish production techniques to manufacture rigid armor for radar antenna hardening
[AD-A091863] N81-14203
Novel production method for high-voltage semiconductor devices with greatest possible economy
[BMFT-FT-T-79-126] N81-14236

PRODUCTION PLANNING
Analytical evaluation of hierarchial planning systems
[MC-BW-118/80] N81-14781

PROGRAM VERIFICATION (COMPUTERS)
The revised ALGOL 68 test set
[MC-IW-122/79] N81-14629
Ada compiler validation implementers' guide
[AD-A091760] N81-14660
PROGTEST: A computer system for the analysis of computational computer programs
[AD-A091653] N81-14667

PROGRAMMING LANGUAGES
Abstracto 84: The next generation
[MC-IW-120/79] N81-14628
Application of microprocessors in measurement
[CONF-801116-1] N81-14641
An overview of the summer programming language
[MC-IW-126/79] N81-14651
Evaluation of the language Ada for use in numerical computations
[NPL-DNACS-30/80] N81-14655
A survey of high level microprogramming languages
[MC-IW-138/80] N81-14657
Problematic features of programming languages: A situational-calculus approach. Part 1: Assignment statements
[AD-A091639] N81-14665
Formal SEMANOL specification of Ada
[AD-A091682] N81-14666
Conversion products/aids survey, August 1980
[PB80-222029] N81-14673

PROJECT PLANNING
A computer program for the generation of logic networks from task chart data
[NASA-CR-3364] N81-14646

PROJECTS
California Water Resources Center: chronicle of research, 1957-1980 --- bibliographies
[PB80-222276] N81-14384

PROPAGATION VELOCITY
Properties of a fluctuating double layer in a magnetized plasma column
[TRITA-EPP-80-02] N81-14860

PROPANE
Effect of fuel nitrogen and hydrogen content on emissions in hydrocarbon combustion
[NASA-TM-81612] N81-14399

PROPELLANT BINDERS
Stage 1 propellant, surveillance report glacial acrylic acid, motors GAA-001 and GAA-002, TP-H1011
[AD-A091707] N81-14110

PROPELLANT CHEMISTRY
Codification of the high-temperature propellant TRHA
[ESA-CR(P)-1374-VOL-1] N81-14106

PROPELLANT EXPLOSIONS
Testimony of Elwood T. Driver, Vice Chairman, National Transportation Safety Board, accompanied by Gerrit J. Walhout, Chief, Human Factors Division, and Matthew M. McCormick, Senior Air Safety Investigator, Human Factors Division N81-13934

PROPELLANT SENSITIVITY
Derivation of the solid propellant response function
[VTH-M-366] N81-14104

PROPELLANT TESTS
Propellant surveillance report, LGM-30 F and G stage 1 phase G, series 1 TP-H1011
[AD-A091765] N81-14109

PROPELLER BLADES
Noise prediction for jetstar prop-fan test
[NASA-TM-81916] N81-14790

PROPULSION
Research, development and demonstration of lead-acid batteries for electric vehicle propulsion
[ANL/OEPM-79-9] N81-14933

PROPULSION SYSTEM CONFIGURATIONS
Advanced Technology Spark-Ignition Aircraft Piston Engine Design Study
[NASA-CR-165162] N81-13963

PROTONS
Realization of the ampere, and measurement of the gyromagnetic ratio of the proton
[NPL-DES-59] N81-14803
Thermodynamic interpretation of multiparticle emission in relativistic heavy ion collisions
[DOE/ER-03992/388] N81-14812

PROTOSTARS
Fragmentation in rotating isothermal protostellar clouds
[NASA-TM-82229] N81-14938

PROTOTYPES
Prototype chemiluminescent analyzer for measurement of hydrazines
[AD-A091678] N81-14032

PROVING
A PASCAL processor validation suite
[NPL-CSU-7/80] N81-14654
Datapoint 6600 COBOL 3.3
[PB80-219868] N81-14675
Sperry univac exec-8 operating system
[PB80-219876] N81-14676

PSYCHOLOGICAL TESTS
Changes of psychometric coefficients and factor structure as a function of test practice
[DFVLR-FB-80-15] N81-14622

PSYCHOMETRICS
Changes of psychometric coefficients and factor structure as a function of test practice
[DFVLR-FB-80-15] N81-14622

PUBLIC HEALTH
Nevada Nuclear Waste Storage Investigations: Quality
[NVO-196-17] N81-14830

PULSE GENERATORS
Time resolved Thomson scattering using a periodically emitting ruby laser --- for plasma diagnostics
[IPF-80-4] N81-14299

PULSED LASERS
Possibilities and limitations of Raman spectroscopy in local temperature and concentration measurements in flames
[DFVLR-FB-80-17] N81-14030
Controls of aeronautical structures under fatigue testing by holographic pulsed lasers interferometry
[ISL-CO-218/79] N81-14300
Fusion driver study --- pulsed lasers system for inertial confinement fusion
[DOE/DP-40006/1] N81-14872

PUMPS
Evaluation of advanced hydraulic turbomachinery for underground pumped hydroelectric storage. Part 1: Single-stage regulated pump turbines for operating heads of 500 to 1000 m
[ANL/ES-100-PT-1] N81-14328

PURIFICATION
Membrane consisting of polyquaternary amine ion exchange polymer network interpenetrating the chains of thermoplastic matrix polymer
[NASA-CASE-NPO-14001-1] N81-14076

PYROLYSIS
Design considerations for a thermal decomposition analytical system
[PB80-219116] N81-14054

PYROTECHNICS
On the improvement of miniature pyrotechnic devices for space application
[ESA-CR(P)-1296] N81-14105
Pyrotechnic shock at the orbiter/external tank forward attachment N81-14142

Q

Q SWITCHED LASERS
Design study for the JET diagnostic systems Quasi-Continuous Laser Scattering --- joint European Tokamak
[IPF-80-2] N81-14298
Time resolved Thomson scattering using a periodically emitting ruby laser --- for plasma diagnostics
[IPF-80-4] N81-14299

QUADRATIC PROGRAMMING
Steepest edge algorithms in linear and nonlinear programming
[AD-A091608] N81-14662

QUALITY CONTROL
Multiparameter hypothesis testing and acceptance sampling
[AD-A091607] N81-14340
Quality-assurance needs and goals in solar energy conversion
[SERI/TP-641-773] N81-14483

QUANTUM THEORY
The broadening of spectral lines by autoionization, radiative transitions, and collisions
[AD-A091506] N81-14036
Use of R-matrix methods for light element evaluations
[LA-UR-80-2673] N81-14050
Research in elementary particle physics
[DOE/ER-03230/T1] N81-14813
A note on Zeno's paradox in quantom theory
[DOE/ER-03992/387] N81-14909
A research program in theoretical high-energy physics
[COO-3130TA-352] N81-14912

QUARTZ CRYSTALS
Performance of a flight qualified, thermoelectrically temperature controlled QCM sensor with power supply, thermal controller and signal processor N81-14158
QUENCHING (ATOMIC PHYSICS)
Energy transfer and quenching rates of laser-pumped electronically excited alkalis in flames [NASA-TM-82230] N81-14303
QUEUEING THEORY
Telephone network behavior in repeated attempts environment: A simulation analysis [FUB-15-1979] N81-14193

R

RADAR ANTENNAS
Manufacturing Methods and Technology (MM/T) project to establish production techniques to manufacture rigid armor for radar antenna hardening [AD-A091863] N81-14203
RADAR IMAGERY
Seasat views North America, the Caribbean, and Western Europe with imaging radar [NASA-CR-163825] N81-14372
RADAR NAVIGATION
Midair and near midair collisions on two- and three-dimensional curvilinear flight paths [DFVLR-FB-80-13] N81-13944
RADAR SCANNING
AEGIS Near-field antenna test system, automated test system for phased array antennas [AD-A091697] N81-14199
Error sources applicable to precision trajectory radar calibration [AD-A091654] N81-14204
Some error probabilities for the association of passive DF measurements with radar returns [AD-A091659] N81-14206
RADIAL VELOCITY
Disruptive shift of magnetic axis noncircular Tokamaks [PPPL-1707] N81-14889
RADIANT HEATING
A radiant heating test facility for space shuttle orbiter thermal protection system certification N81-14149
RADIATION ABSORPTION
The use of approximate expressions in power transmission spectrometry [NPL-DES-64] N81-14024
RADIATION CHEMISTRY
Radiation-induced crosslinking and grafting reactions in polyethylene [DOE/ER-02845/T1] N81-14090
RADIATION DAMAGE
Neutron radiation effects in fiber optics [AD-A091661] N81-14838
RADIATION EFFECTS
Neutron and gamma radiation effects on GaAlAs laser diodes [AD-A091795] N81-14305
Electron paramagnetic resonance of material properties and processes [SAND-80-1230C] N81-14807
RADIATION HARDENING
Manufacturing Methods and Technology (MM/T) project to establish production techniques to manufacture rigid armor for radar antenna hardening [AD-A091863] N81-14203
RADIATION MEASUREMENT
Estimates of incoming shortwave radiation and net radiation from standard meteorological data [KNMI-WR-80-6] N81-14189
Measurement of the harmonic content across a bounded ultrasonic beam [AD-A091646] N81-14798
RADIATION SPECTRA
Quasi elastic light scattering from macromolecules in solution [CISE-1528] N81-14083
RADIATIVE TRANSFER
The broadening of spectral lines by autoionization, radiative transitions, and collisions [AD-A091506] N81-14036
Research on atomic and molecular physics [DOE/ER-06027/2] N81-14818
RADICALS
Laser excitation of fluorescence in the A-X system of NH [NASA-TM-82231] N81-14304
RADIO ASTRONOMY
Activities during 1979: Astronomical Research [ISSN-0531-4496] N81-14936
RADIO COMMUNICATION
Use of amplitude compandored SSB in the mobile radio bands [PB80-215759] N81-14211
Spectral efficiency of FM and ACSB radios [PB80-215767] N81-14215
RADIO DIRECTION FINDERS
Some error probabilities for the association of passive DF measurements with radar returns [AD-A091659] N81-14206
An automatic lightning detection system in northern California [PB80-225592] N81-14597
RADIO ECHOES
Data obtained in radiowave propagation experiments on the path Kirunai Stockholm [FOA-C-30187-E2] N81-14192
RADIO EQUIPMENT
Single sideband communications. Citations from the NTIS data base [PB80-814262] N81-14209
RADIO FREQUENCIES
Precise RF timing signal distribution to remote stations --- fiber optics [NASA-CASE-NPO-14749-1] N81-14186
RADIO RECEIVERS
Use of amplitude compandored SSB in the mobile radio bands [PB80-215791] N81-14212
Convenience circuits --- amplitude compandored single sideband radios [PB80-215783] N81-14213
RADIO RECEPTION
Rhyme test performance of ACSB (amplitude compandored single sideband), narrow band, and FM radios [PB80-215932] N81-14217
RADIO RELAY SYSTEMS
Analysis, design, and performance evaluation of a single channel ACSB system [PB80-215775] N81-14214
RADIO TELESCOPES
Activities of the Radio Laboratory, 1977 [REPT-S-110] N81-14190
Improvement of the sensitivity of millimeter wave radio telescopes by synchronous tracking [REPT-S-108] N81-14935
RADIO TRANSMISSION
Multipath induced errors, nonstatistical correction of position errors, correction of propagation anomalies [DFVLR-MITT-79-17] N81-14188
Single sideband communications. Citations from the NTIS data base [PB80-814262] N81-14209
Meteorological factors affecting evaporation duct height climatologies [AD-A091665] N81-14583
RADIOACTIVE WASTES
Combined Electrolysis Catalytic Exchange (CECE) [MLM-2774] N81-14051
Long-term high-level waste technology [DOE/SR/WM-79/2] N81-14827
Long-term high-level waste technology program: Strategy document [DOE/SR/WM-79/3-REV-4/80] N81-14829
Nevada Nuclear Waste Storage Investigations: Quality [NVO-196-17] N81-14830
RADIOMETERS
Microwave signatures of snow measured in Finland [REPT-S-109] N81-14578
RAIL TRANSPORTATION
Sound source location measurements on high speed trains [DFVLR-MITT-79-15] N81-14791
RAILS
Sound source location measurements on high speed trains [DFVLR-MITT-79-15] N81-14791
RAIN
Three-Hour rainfall required for flash flooding on small streams [PB80-225576] N81-14596
RAIN EROSION
ARID zone geosystems [AD-A091689] N81-14379
RAMAN SPECTRA
Bromine as a partial oxidant. Oxidation state and charge transport in brominated nickel and palladium bisdiphenylglyoximates: A comparison with the ionidated materials and resonance Raman structure spectra correlations for polybromides [AD-A091534] N81-14037
Laser-Raman/Rayleigh flow diagnostic techniques applied to subsonic flow [AD-A091695] N81-14275
Nuclear excitations and reaction mechanisms [DOE/ER-03235/1] N81-14825
RAMAN SPECTROSCOPY
Some results on measurement of temperature and density in a flame by Raman spectroscopy N81-14019
Possibilities and limitations of Raman spectroscopy in local temperature and concentration measurements in flames [DFVLR-FB-80-17] N81-14030
RANDOM NOISE
On the performance of a modified sign detector for M-dependent data [AD-A091570] N81-14771
RANDOM NUMBERS
Random variate generation: A survey [AD-A091343] N81-14774
RANDOM PROCESSES
Methods in probability and statistical inference [COO-2751-4] N81-14775
RANKINE CYCLE
Development and demonstration of a Stirling/Rankine heat activated heat pump [DOE/CS-20043/T1] N81-14283
RAY TRACING
Volumetric pattern prediction of antennas on aircraft using the geometrical theory of diffraction [DFVLR-FB-80-01] N81-14195
Ray theory to predict the propagation of broadband fan noise [PNR-90030] N81-14794
RAYLEIGH DISTRIBUTION
Long term variability of windspeed [AD-A091802] N81-14581
RAYLEIGH SCATTERING
Electrochromic glasses [AD-A091641] N81-14088
Laser-Raman/Rayleigh flow diagnostic techniques applied to subsonic flow [AD-A091695] N81-14275
RAYON
Heatshield material selection for advanced ballistic reentry vehicles --- rayon fiber cloth impregnated with phenolic resin N81-14169
RC CIRCUITS
Integrated RC-circuits in ALTA-technology on one substrate [BMFT-FB-T-79-107] N81-14227
Basic concepts for integrated RC networks and hybrid circuits on organic substrate foils [BMFT-FB-T-79-87] N81-14221
REACTION KINETICS
Chemical kinetic models for combustion of hydrocarbons and formation of nitric oxide [NASA-TP-1794] N81-14017
Agglomeration in suspension: A study of mechanisms and kinetics [WTHD-120] N81-14027
The chemistry of energetic fragments [AD-A091823] N81-14031
Polymer activated catalysts [AD-A091750] N81-14085
Electrochemical and surface analysis of the reactive interfaces in the Li (Si)/FeS2 primary battery [SAND-79-2155] N81-14413
Chemical kinetic and photochemical data sheets for atmospheric reactions [AD-A091631] N81-14541
Development of a preprototype sabatier CO2 reduction subsystem [NASA-CR-160885] N81-14624
Molecular beam studies of low energy reactions [AD-A091611] N81-14806
REACTION TIME
Advanced ion implantation techniques [BMFT-FB-T-79-37] N81-14897
REACTIVITY
Effects of several trace contaminants on fuel cell performance [DOE/METC/RI-80/16] N81-14455

REACTOR DESIGN
Energy policy study. Volume 10: Nuclear power regulation
[DOE/EIA-0201/10] N81-14423
Preconceptual design and assessment of a Tokamak hybrid reactor
[PNL-2720] N81-14883
National mirror fusion program plan
[UCAR-10042-80] N81-14892
Technology of direct conversion for mirror reactor end-loss plasma
[UCRL-84235] N81-14893

REACTOR MATERIALS
Statistical evaluation of J sub c in a 533-B weld metal and heat affected zone
[TRITA-HFL-0026] N81-14323
J-integral elastic plastic fracture mechanics evaluation of the stability of cracks in nuclear reactor pressure vessels
[SAND-80-0688] N81-14357

REACTOR PHYSICS
Most probable ideal magnetohydrodynamic equilibria. 2: Reversed field pinch regime
[DOE/ET-53045/2] N81-14878
Fusion reactor physics and technology
[DOE/ET-52048/T1] N81-14881

REACTOR SAFETY
Statistical evaluation of J sub c in a 533-B weld metal and heat affected zone
[TRITA-HFL-0026] N81-14323
Medium-size high temperature gas-cooled reactor
[GA-A-15863] N81-14833

REAL NUMBERS
Hyperperfect numbers with more than two different prime factors
[MC-NW-87/80] N81-14746

REAL VARIABLES
A precise definition of separation of variables
[MC-TW-194/79] N81-14738

RECEIVERS
Evaporation duct effects on maximum intercept range for 18-1 and 37.5-GHz emitters. A theoretical analysis of expected frequency distributions of intercept range for five oceanic areas
[AD-A091724] N81-14205
Threshold signal reception in electromagnetic interference environment. Part 1: Problems and approaches
[PB80-218753] N81-14216
Solar central receiver hybrid power system, phase 1. Volume 3: Appendices
[DOE/ET-21038/1-VOL-3] N81-14418

RECOMBINATION REACTIONS
Computer simulations for the microscopic mechanism of hot gas erosion
[AD-A091859] N81-14060
Infrared emission spectroscopy of low pressure gaseous discharges, 3
[AD-A091744] N81-14540

RECORDS
Automated medical information system of the Los Alamos Scientific Laboratory
[LA-UR-80-2160] N81-14621

RECOVERABILITY
A Recoverable Plasma Diagnostics Package (RPDP) for Spacelab N81-14956

RECOVERY PARACHUTES
Space shuttle solid rocket booster recovery subsystem
[NASA-TM-82389] N81-13990

RECTANGLES
Computing the perimeter of a set of rectangles
[MC-IW-121/79] N81-14729

RECURSIVE FUNCTIONS
Exception handling with multiexit statements
[MC-IW-125/79] N81-14650
Computing in algebraic systems
[MC-IW-130/80] N81-14653
A recursive approach to the implementation of enumerative methods
[MC-BW-116/80] N81-14728

RECYCLING
Recycled program: Phase 1-Test procedures for recycled oil used as burned fuel
[PB80-215536] N81-14133
Study of seed reprocessing systems for open cycle coal fired MHD power plants. Task 1: Selection of processes for more detailed study
[DOE/ET-15613/T1] N81-14435

REDUCTION (CHEMISTRY)
Effects of several trace contaminants on fuel cell performance
[DOE/METC/RI-80/16] N81-14455

REENTRY EFFECTS
An effective combined environment test facility N81-14150

REENTRY TRAJECTORIES
Metric accuracy analysis
[AD-A091749] N81-13982

REENTRY VEHICLES
Thermal protection of reentry vehicles by actively cooled nosetips N81-14165
Heatshield material selection for advanced ballistic reentry vehicles --- rayon fiber cloth impregnated with phenolic resin N81-14169

REFLECTANCE
Photovoltaic mechanisms in polycrystalline thin-film silicon solar cells
[DOE/ET-23108/3] N81-14442

REFLECTED WAVES
Exhaust noise in flight: The role of acoustic installation effects
[PNR-90029] N81-14793

REFLECTION
Imaging of surfaces and defects of crystals
[DOE/ER-02995/4] N81-14903

REFRACTIVITY
Extended applicability of optical wind sensing techniques
[AD-A091606] N81-14582

REFRACTORY MATERIALS
Joining of ceramics for high performance energy systems
[DOE/ET-15359/1] N81-14092

REFRIGERATING MACHINERY
Ice-maker heat pump development
[ORNL/CON-50] N81-14282

REGENERATION (ENGINEERING)
Regenerative engine analysis
[AD-A091755] N81-13965
Regenerative flywheel storage system, volume 2
[UCRL-15290-VOL-2] N81-14485
Regenerative flywheel energy storage system. Volume 3: Life cycle and cost-benefit analysis of a battery-flywheel electric car
[UCRL-15290-VOL-3] N81-14486

REGGE POLES
Research in elementary particle physics
[DOE/ER-03230/T1] N81-14813

REGIONS
Conformal mapping of multiply connected regions onto regions with specified boundary shapes N81-14712

REGRESSION ANALYSIS
A unilateral representation for autoregressive random field models
[AD-A091644] N81-14664
General results, time series in M dimensions
[AD-A091578] N81-14766
Biased regression: A ten year perspective
[AD-A091551] N81-14770

REGULATIONS
Energy policy study. Volume 10: Nuclear power regulation
[DOE/EIA-0201/10] N81-14423

REINFORCED PLASTICS
Vanadium trineodecanoate promoter for fiberglass-polyester soil surfacings
[AD-A091785] N81-14084

REINFORCEMENT (STRUCTURES)
Design criteria for deflection capacity of conventionally reinforced concrete slabs. Phase 3: Summary of design criteria and design and construction details; design examples
[AD-A091616] N81-14177

REJECTION
Performance characteristics of large-aperture, ten-cell, atmospheric pressure isobutane Cerenkov counters
[DOE/ER-14529/1] N81-14509

RELATIVISTIC PLASMAS
Microwave heating of the ELMO bumpy torus relativistic electron ring
[DOE/ER-53092/13] N81-14874

RELEASING
Chemical release module facility N81-14957

RELIABILITY
Changes of psychometric coefficients and factor structure as a function of test practice
[DFVLR-FB-80-15] N81-14622

RELIABILITY ANALYSIS
Wind shear systems integration plan, VICON (visual confirmation) reliability analysis
[PB80-218233] N81-13949

RELIABILITY ENGINEERING
An investigation of safety hazards and reliability problems in aerial refueling stores
[AD-A091788] N81-13938
Error sources applicable to precision trajectory radar calibration
[AD-A091654] N81-14204

REMOTE CONTROL
Integrated circuits for remote command and data transmission
[BMFT-FB-T-79-50] N81-14230

REMOTE MANIPULATOR SYSTEM
Shuttle remote manipulator system hardware test facility N81-14146
The role of the real-time simulation facility, SIMFAC, in the design, development and performance verification of the Shuttle Remote Manipulator System (SRMS) with man-in-the-loop N81-14147

REMOTE SENSING
Remote sensing applied to pollution monitoring. Citations from the International Aerospace Abstracts data base
[NASA-CR-163830] N81-14388
Remote sensing of wind speed and direction by laser Doppler anemometer
[DFVLR-MITT-79-18] N81-14576
Microwave signatures of snow measured in Finland
[REPT-S-109] N81-14578
Surface based remote sensing in marine air. Extensive analysis of echoes by several sensors reveals evolutionary atmospheric processes related to weather capable of affecting naval operations
[AD-A091518] N81-14584

REMOTE SENSORS
Earth Resources: a continuing bibliography with indexes
[NASA-SP-7041(27)] N81-14371
Winds and wind shear in-situ sensors N81-14563

REMOTELY PILOTED VEHICLES
A survey of simulation and test results for assessing RPV performance in a WBIC environment
[AD-A091603] N81-13954

REPRESENTATIONS
A study of the representations of SL(2,C) using noninfinitesimal methods
[MC-TW-190/79] N81-14736

REQUIREMENTS
The effects of symbology and spatial arrangement on the comprehension of software specifications
[AD-A091614] N81-14669

RESCUE OPERATIONS
Crew stress and fatigue in the PAVE
[AD-A091668] N81-14620

RESEARCH
Development of a low-cost black-liquid solar collector, phase 2
[DOE/CS-30171/2A] N81-14492

RESEARCH AND DEVELOPMENT
Information and guidelines for a proposed laboratory accreditation and product certification program for photovoltaic energy conversion systems
[PB80-217615] N81-14501
Documentation of and information on protective rights relating to government support on technological research and development
[BMFT-FB-T-79-186] N81-14918
Activities of the Institute of Sound and Vibration Research for the year ending March 1980 N81-14960

RESEARCH FACILITIES
Effects of downstream distance on turbulence decay for the compressor research facility low conditioning system
[AD-A091543] N81-14276

RESEARCH MANAGEMENT
Earth resources
[FOA-C-10148-M3] N81-14375

RESERVES
Underground natural gas storage in the United States 1979 - 1980 heating year
[DOE/EIA-0239/79] N81-14421

RESERVOIRS
Network flow optimization for water resources planning with uncertainties in supply and demand
[PB80-221161] N81-14934

RESIDENTIAL ENERGY
Regional conceptual design and analysis studies for residential photovoltaic systems, volume 2
[SAND-78-7040/2] N81-14416
Solar photovoltaic/thermal residential experiment, phase 1
[DOE/ET-20279/103] N81-14437
Residential heating costs: A comparison of geothermal solar and conventional resources
[PNL-3200] N81-14464
Solar ponds. Citations from the NTIS data base
[PB80-814460] N81-14494

RESIDUES
Alcohol production from agricultural and forestry residues
[DOE/EV-0108] N81-14125
The identification of trends in outgassing technology N81-14160

RESIN MATRIX COMPOSITES
Literature research on the mechanical properties of fibre composite materials. Analysis of the state of the art, volume 1
[RAE-LIB-TRANS-2045] N81-14003

RESINS
An analytical chemical system for the determination of heavy metals and organic compounds
[DOE/EV-04320/1] N81-14045

RESISTORS
Integrated RC-circuits in ALTA-technology on one substrate
[BMFT-FB-T-79-107] N81-14227
Basic concepts for integrated RC networks and hybrid circuits on organic substrate foils
[BMFT-FB-T-79-87] N81-14231

RESOURCES MANAGEMENT
Earth resources
[FOA-C-10148-M3] N81-14375
California Water Resources Center: chronicle of research, 1957-1980 --- bibliographies
[PB80-222276] N81-14384

RESPIRATORY RATE
Metabolic rate measurement system
[NASA-CR-160893] N81-14614

RETAINING
Development of a simple fluidized-bed coal combustion model for the assessment of a pressurized fluidized-bed combustion system for electrical power generation
[DOE/METC/SP-80/15] N81-14044

RETROFITTING
Geothermal energy development in the eastern United States. Geothermal space heating, Pittsville Middle/Elementary School, Pittsville, Maryland
[PB80-221088] N81-14499

RETROREFLECTION
Estimation on the Wettzell coordinates from satellite laser ranging at Kootwijk, San Fernando and Wettzell
[VTH-LR-296] N81-14373

REUSABLE SPACECRAFT
The 11th Space Simulation Conference
[NASA-CP-2150] N81-14138

REUSE
Recycled program: Phase 1-Test procedures for recycled oil used as burned fuel
[PB80-215536] N81-14133

REVERSE FIELD PINCH
Most probable ideal magnetohydrodynamic equilibria. 2: Reversed field pinch regime
[DOE/ET-53045/2] N81-14878

REYNOLDS NUMBER
The effects of shear and roughness on vortex shedding patterns behind a circular cylinder at critical Reynolds numbers --- ocean thermal energy conversion cold water pipes
[DOE/NOAA/OTEC-1] N81-14284

RHEOLOGY
Improved polymers for enhanced oil recovery synthesis and rheology
[DOE/BETC-5603/10] N81-14089

RICCATI EQUATION
On a class of nearly singular optimal control problems
[MC-TW-196/80] N81-14683

RIEMANN MANIFOLD
A precise definition of separation of variables
[MC-TW-194/79] N81-14738

RIPPLES
Torque ripple in a Darrieus, vertical axis wind turbine
[SAND-80-0475] N81-14417

ROBOTS
Advanced automation for space missions: Technical summary
[NASA-CR-163827] N81-14914

ROBUSTNESS (MATHEMATICS)
Application of vector performance optimization to a robust control loop design for a fighter aircraft
[DFVLR-FB-80-14] N81-13970
Minimum distance estimation and components of goodness of fit statistics
[AD-A091514] N81-14769

ROCKET ENGINES
Investigations and developments on a Hall-Ion-Thruster
[DFVLR-FB-80-09] N81-13994

ROCKET EXHAUST
Ionospheric effects of rocket exhaust products (HEAO-C, Skylab and SPS-HLLV)
[DOE/ER-0082] N81-14544

ROCKET PROPELLANTS
Prototype chemiluminescent analyzer for measurement of hydrazines
[AD-A091678] N81-14032

ROCKET PROPELLED SLEDS
Rocket sled improved velocity measuring system feasibility study
[AD-A091634] N81-13978

ROCKET-BORNE INSTRUMENTS
Wind tunnel tests of a Gerdien capacitor vehicle combination
[AD-A091719] N81-13986
The swept angle retarding mass spectrometer: Initial results from the Michigan auroral probe sounding rocket
[NASA-TM-78317] N81-14530
Rocket measurements of electric fields, electron density and temperature during the three phases of auroral substorms
[TRITA-EPP-79-22] N81-14859

ROCKS
Systematic study of metal ion sorption on selected geologic media --- tracers for oil recovery systems
[DOE/BETC/OR-14] N81-14545

ROOTS OF EQUATIONS
On the geometry of multivariable root-loci
[RR-118] N81-14748

ROTARY WING AIRCRAFT
Aircraft icing instrumentation: Unfilled needs --- rotary wing aircraft N81-14560

ROTARY WINGS
Service life determination for the UH-60-A (UTTAS) helicopter elastomeric bearings
[AD-A091756] N81-14324

ROTATING BODIES
Unsteady pressure distribution measurement on a rotating ellipsoid
[DFVLR-FB-80-18] N81-13927

ROTATING DISKS
Production of optically thin free-standing oil films from the edge of a rotating disc --- liquid foils for ion accelerators
[DOE/ER-01388/457] N81-14840

ROTORS
Mechanisms of damage accumulation in time-dependent cyclic deformation
[DOE/ER-10570/1] N81-14363
A general calculation method for the dynamic response to discrete gust distributions as exemplified by the rotorblade of a wind energy converter
[DFVLR-FB-80-12] N81-14408

RUBY LASERS
Time resolved Thomson scattering using a periodically emitting ruby laser --- for plasma diagnostics
[IPF-80-4] N81-14299
Electron heating and confinement measurements in EBT-S using Thompson scattering
[ORNL/TM-7437] N81-14887

RUNGE-KUTTA METHOD
On the economization of stabilized Runge-Kutta methods with applications to parabolic initial value problems
[MC-NW-74/79] N81-14731
On a class of explicit three-step Runge-Kutta methods with extended real stability intervals
[MC-NW-77/79] N81-14734
Superconvergence in collocation and implicit Runge-Katta methods for Volterra-type integral equations of the second kind
[MC-NW-80/80] N81-14743
On V sub o stability of numerical methods for Volterra integral equations of the second kind
[MC-NW-84/80] N81-14744

RUSTING
Air oxidation and seawater corrosion Hastelloy S and Hastelloy C-4 --- storage capsules for radioisotope heat source fuel
[PNL-3344] N81-14072

RUTILE
Plastic deformation in oxide ceramics
[DOE/ER-04217/T1] N81-14091

S

SAFETY
R. F. testing of the third generation defense communication satellite N81-14141
Overview of the environmental concerns of coal transportation
[ANL/EES/TM-99] N81-14515

SAFETY MANAGEMENT
An investigation of safety hazards and reliability problems in aerial refueling stores
[AD-A091788] N81-13938
The Federal Aviation Administration lightning protection modules designed for leadless devices
[AD-A091642] N81-13939

SALINITY
The ability of passive microwave systems to detect sea ice --- Gulf of Bothnia, Baltic Sea
[REPT-S-113] N81-14374
Alternative energy sources session ocean thermal energy conversion: Technology development
[PB80-218159] N81-14500

SAMPLES
Behadur efficiency and small-sample efficiency: A numerical study
[MC-SW-68/80] N81-14764

SAMPLING
A two-stage nonrecursive filter/decimator
[SAND-80-0891] N81-14639

SANDWICH STRUCTURES
Combustion mechanisms of solid propellants
[AD-A091857] N81-14108

SATELLITE ATTITUDE CONTROL
Handbook of satellite pointing errors and their statistical treatment
[ESS/SS-997] N81-13985

SATELLITE OBSERVATION
System techniques, satellites, orbit design, thermal control, power supply, attitude control, telemetry system
[DFVLR-FB-79-37] N81-13984
Earth Resources: a continuing bibliography with indexes
[NASA-SP-7041(27)] N81-14371
Remote sensing applied to pollution monitoring. Citations from the International Aerospace Abstracts data base
[NASA-CR-163830] N81-14388
Monitoring pollutant gases from space using passive microwave techniques --- lowest layer of the troposphere
[NPL-QU-59] N81-14505
Catalog of sea state and wind speed in the South Atlantic Bight
[NASA-CR-156872] N81-14601

SATELLITE ORBITS
An analytical generator for drag-free satellite orbits
[RAE-TR-80085] N81-13981

SATELLITE POWER TRANSMISSION (TO EARTH)
Control and dynamics study for the satellite power system. Volume 1: MPTS/SPS collector dynamic analysis and surface deformation
[NASA-CR-163826] N81-14395
Satellite Power System: Utility impact study
[EPRI-AP-1548] N81-14470
SPS Energy Conversion Power Management Workshop
[NASA-CR-163840] N81-14491

Environmental assessment for the Satellite Power System. Concept development and evaluation program: Effects of ionospheric heating on telecommunications
[DOE/ER-10003/T2] N81-14507

SATELLITE SOLAR ENERGY CONVERSION
SPS Energy Conversion Power Management Workshop
[NASA-CR-163840] N81-14491

SATELLITE SOLAR POWER STATIONS
Environmental impacts of the satellite power system (SPS) on the middle atmosphere
[NASA-TM-82228] N81-14508

SATELLITE-BORNE PHOTOGRAPHY
Annual data and verification tabulation Atlantic tropical cyclones 1979
[PB80-226301] N81-14598

SATELLITES
Tables of artificial satellites, 1979
[AERONOMICA-ACTA-F-30-1980] N81-13983
Tether facility presentation N81-14958

SCALE EFFECT
Parametric study of the stability margins of cable-in-conduit superconductors: Experiment
[CONF-800980-11] N81-14254

SCALE MODELS
Rotary balance data for a single-engine agricultural airplane configuration for an angle-of-attack range of 8 deg to 90 deg
[NASA-CR-3311] N81-13923
Active control of an explosive wing-store flutter case
[MBB-FE-17/S/PUB/25] N81-13973

SCANDIUM
Spectroscopic investigations and determination of the temperature distribution in a metal halide discharge lamp
[NPL-QU-54] N81-14026

SCATHA SATELLITE
P78-2 (SCATHA) satellite thermal balance test, a laboratory test N81-14162

SCATTERING
On the feasibility of quantitative ultrasonic determination of fracture toughness: A literature review
[NASA-CR-3356] N81-14337

SCATTERING CROSS SECTIONS
Cross sections for charge transfer collisions involving hydrogen atoms --- fusion plasmas
[IPPJ-AM-15] N81-14847

SCENE ANALYSIS
Feature tagging
[AD-A091691] N81-14378

SCHLIEREN PHOTOGRAPHY
Heat-transfer tests on a full and 1/4 scale aim-9E sidewinder missile and a 1/15 scale GBU-8 guided bomb unit at Mach numbers 1.5, 2.0 and 2.5
[AD-A091805] N81-13987

SCHOTTKY DIODES
Monolithically integrated circuits on GaAs
[BMFT-FB-T-79-176] N81-14239

SCHROEDINGER EQUATION
On a new series of integrable nonlinear evolution equations
[IPPJ-484] N81-14846

SEA ICE
The ability of passive microwave systems to detect sea ice --- Gulf of Bothnia, Baltic Sea
[REPT-S-113] N81-14374

SEA STATES
Catalog of sea state and wind speed in the South Atlantic Bight
[NASA-CR-156872] N81-14601

SEALING
Sealing joints and cracks, thin resurfacing, and locating voids under concrete slabs
[PB80-215635] N81-14182

SEASAT PROGRAM
Seasat views North America, the Caribbean, and Western Europe with imaging radar
[NASA-CR-163825] N81-14372

SEASAT SATELLITES
SEASAT altimeter atmospheric range correction
[AD-A091504] N81-14383

SEDIMENT TRANSPORT
ARID zone geosystems
[AD-A091689] N81-14379

SEISMIC WAVES
An analysis of the characteristics of Rayleigh waves produced by surface explosions
[AD-A091806] N81-14207
Direct detection of hydrocarbons using seismic procedures
[BMFT-FB-T-79-31] N81-14534
Seismological bulletin of the seismograph stations in the Netherlands, volume 63, 1975
[KNMI-108-63] N81-14538

SEISMOGRAMS
Seismological bulletin of the seismograph stations in the Netherlands, volume 63, 1975
[KNMI-108-63] N81-14538

SEISMOGRAPHS
Seismological bulletin of the seismograph stations in the Netherlands, volume 63, 1975
[KNMI-108-63] N81-14538

SEISMOLOGY
Direct detection of hydrocarbons using seismic procedures
[BMFT-FB-T-79-31] N81-14534
Internal seismological stations for monitoring a comprehensive test ban theory
[FOA-C-20358-T1] N81-14535
Design and development of a seismic data center
[AD-A091621] N81-14924

SELECTION
An examination of the performance of two-stage group screening for use in computer simulation
[AD-A091553] N81-14668

SELF OSCILLATION
Chaotically transitional phenomena in the forced negative-resistance oscillator --- systems simulation
[IJJP-482] N81-14842

SEMICONDUCTING FILMS
Electrodeposition of polycrystalline and amorphous silicon for photovoltaic applications
[DOE/ET-23046/3] N81-14443

SEMICONDUCTOR DEVICES
Novel production method for high-voltage semiconductor devices with greatest possible economy
[BMFT-FT-T-79-126] N81-14236
Measurement techniques for high power semiconductor materials and devices
[PB80-217623] N81-14261

SEMICONDUCTOR DIODES
Neutron and gamma radiation effects on GaAlAs laser diodes
[AD-A091795] N81-14305

SEMICONDUCTORS (MATERIALS)
Measurement techniques for high power semiconductor materials and devices
[PB80-217623] N81-14261
Electron paramagnetic resonance of material properties and processes
[SAND-80-1230C] N81-14807

SENSITIVITY
Improvement of the sensitivity of millimeter wave radio telescopes by synchronous tracking
[REPT-S-108] N81-14935

SEPARATED FLOW
Experimental study of supersonic viscous leeside flow over a slender delta wing
[NASA-TM-81248] N81-14265

SEPARATORS
Partial interlaminar separation system for composites
[NASA-CASE-LAR-12065-1] N81-14000
Helium-jet coupled mass separator: Advances and directions
[CONF-800870-1] N81-14047

SERIES (MATHEMATICS)
A quick accurate method for calculating temperatures arising from rectangular and circular microcircuit heat sources
[AWRE-O-30/80] N81-14241

SERUMS
Electron spin resonance of homozygous beta thalassemic plasma
[ISS-P-79/13] N81-14850

SERVICE LIFE
Joining of ceramics for high performance energy systems
[DOE/ET-15359/1] N81-14092
Service life determination for the UH-60-A (UTTAS) helicopter elastomeric bearings
[AD-A091756] N81-14324

SERVOCONTROL
An investigation of a digital electrohydraulic servovalve
[AD-A091563] N81-14326

SETTLING
Determination of soil properties from field observations of settlement
[PB80-213226] N81-14181

SHADOWGRAPH PHOTOGRAPHY
A camera device for the measurement of pin bowing in AGR fuel elements
[TDB-350] N81-14291

SHAFTS (MACHINE ELEMENTS)
Improved capabilities to detect incipient bearing failures
[AD-A091687] N81-14325

SHALE OIL
On-line Zeeman atomic absorption spectroscopy for mercury analysis in oil shale gases
[PB80-216922] N81-14055

SHALLOW WATER
Preliminary results on a comparison of shallow water wave predictions
[KNML-WR-80-5] N81-14602

SHEAR FLOW
Stability of three-dimensional shear flows: Criteria for inviscid disturbance excitation
[DFVLR-FB-80-05] N81-14272
The effects of shear and roughness on vortex shedding patterns behind a circular cylinder at critical Reynolds numbers --- ocean thermal energy conversion cold water pipes
[DOE/NOAA/OTEC-1] N81-14284

SHEAR STRESS
Review of theoretical and experimental results on three dimensional turbulent wakes and boundary layers
[ONERA-NT-1980-4] N81-13930
Plastic deformation in oxide ceramics
[DOE/ER-04217/T1] N81-14091
Boundary element analysis of time-dependent inelastic deformation of cracked plates loaded in anti-plane shear
[DOE/ER-02733/28] N81-14361

SHELL THEORY
Application of the shell model to nuclear spectroscopy
[DOE/TIC-11287] N81-14828

SHOCK LAYERS
Some aspects of adapting computational mesh to complex flow domains and structures with application to blown shock layer and base flow N81-14716

SHOCK TESTS
Development of high-temperature turbine subsystem technology to a technology readiness status, phase 2
[FE-1806-72] N81-14332

SHOCK WAVES
Effect of stellar structure on supernova remnant evolution
[LA-UR-80-2756] N81-14940

SHORELINES
Computerized bathymetry and shorelines of the Great Lakes
[PB80-218308] N81-14387

SHORT WAVE RADIATION
Estimates of incoming shortwave radiation and net radiation from standard meteorological data
[KNMI-WR-80-6] N81-14189

SIDEBANDS
Single sideband communications. Citations from the Engineering Index data base
[PB80-814270] N81-14210

SIDELOBE REDUCTION
Calculation of traveling-wave wire antenna arrays with mutual impedances
[REPT-S-111] N81-14191

SIGNAL ANALYSIS
Digital data reduction algorithm for oscillatory signals with an application to L-instability
[VTH-LR-298] N81-14194

SIGNAL FLOW GRAPHS
Negative ion chemistry in the terrestrial D-region and signal flow graph theory
[AERONOMICA-ACTA-A-217-1980] N81-14528

SIGNAL GENERATORS
Frequency translating phase conjugation circuit for active retrodirective antenna array --- microwave transmission
[NASA-CASE-NPO-14536-1] N81-14185

SIGNAL PROCESSING
Acoustic fuel quantity measurement system. Signal conditioning unit
[AD-A091758] N81-13961
Performance of a flight qualified, thermoelectrically temperature controlled QCM sensor with power supply, thermal controller and signal processor N81-14158
Light communication systems. Citations from the NTIS data base
[PB80-815319] N81-14218
Monolithically integrated circuits on GaAs
[BMFT-FB-T-79-176] N81-14239
Evaluation of a CCD for analog delay
[AD-A091622] N81-14247
Satellite Power System (SPS) antenna pointing control
[NASA-CR-3350] N81-14392
Applications of the Fast Fourier Transform. Citations from the NTIS data base
[PB80-815491] N81-14677
The WISP/HF system for Spacelab N81-14954

SIGNAL RECEPTION
Use of amplitude compandored SSB in the mobile radio bands
[PB80-215791] N81-14212
Threshold signal reception in electromagnetic interference environment. Part 1: Problems and approaches
[PB80-218753] N81-14216
Rhyme test performance of ACSB (amplitude compandored single sideband), narrow band, and FM radios
[PB80-215932] N81-14217

SIGNAL TO NOISE RATIOS
Improved noise suppression for multiband imagery
[AD-A091815] N81-14196
Extended applicability of optical wind sensing techniques
[AD-A091606] N81-14582

SIGNAL TRANSMISSION
Precise RF timing signal distribution to remote stations --- fiber optics
[NASA-CASE-NPO-14749-1] N81-14186
Environmental assessment for the Satellite Power System. Concept development and evaluation program: Effects of ionospheric heating on telecommunications
[DOE/ER-10003/T2] N81-14507

SIGNATURE ANALYSIS
A study of the sonic-boom characteristics of a blunt body at a Mach number of 6
[NASA-TP-1787] N81-13915

SILICON
Large-scale integrated MOS circuits with small dimensions. Preparation of thin films
[BMFT-FB-T-79-55] N81-14226
Medium power silicon transistors --- fabrication and assembling
[BMFT-FB-T-79-160] N81-14237
Electrochemical and surface analysis of the reactive interfaces in the Li (Si)/FeS2 primary battery
[SAND-79-2155] N81-14413
Electrodeposition of polycrystalline and amorphous silicon for photovoltaic applications
[DOE/ET-23046/3] N81-14443
Homogeneous phosphorus of silicon by neutron transmutation
[BMFT-FB-T-79-52] N81-14898

SILICON CARBIDES
Changes in surface chemistry of silicon carbide (0001) surface with temperature and their effect on friction
[NASA-TP-1756] N81-14079

SILICON CONTROLLED RECTIFIERS
Lead acid battery pulse discharge investigation
[DOE/CH-00128/1] N81-14427

SILICON DIOXIDE
Physical and chemical processes for the generation of 1 micron structures
[BMFT-FB-T-79-51] N81-14023
Photovoltaic mechnisms in polycrystalline thin-films silicon solar cells
[DOE/ET-23108/5] N81-14440
Electron paramagnetic resonance of material properties and processes
[SAND-80-1230C] N81-14807

SILICON FILMS
Measurement techniques for high power semiconductor materials and devices
[PB80-217623] N81-14261

SILICON NITRIDES
Mechanical characterization of Si3N4 N81-14005
Development of high performance sintered Si3N4
[AD-A091757] N81-14008

SILICONES
Development of a high energy density capacitor for plasma thrusters
[AD-A091839] N81-13995

SIMULATION
Telephone network behavior in repeated attempts environment: A simulation analysis
[FUB-15-1979] N81-14193

SIMULATORS
Survey of CIG data base generation from imagery
[AD-A091508] N81-14923

SINGLE CRYSTALS
Ultrasonic attenuation in normal and superconducting indium
[AD-A091605] N81-14797
The development of fluorides for high power laser optics
[DOE/DP-40020/1] N81-14839

SINGLE SIDEBAND TRANSMISSION
Single sideband communications. Citations from the NTIS data base
[PB80-814262] N81-14209
Single sideband communications. Citations from the Engineering Index data base
[PB80-814270] N81-14210
Use of amplitude compandored SSB in the mobile radio bands
[PB80-215759] N81-14211
Use of amplitude compandored SSB in the mobile radio bands
[PB80-215791] N81-14212
Convenience circuits --- amplitude compandored single sideband radios
[PB80-215783] N81-14213
Analysis, design, and performance evaluation of a single channel ACSB system
[PB80-215775] N81-14214
Spectral efficiency of FM and ACSB radios
[PB80-215767] N81-14215
Rhyme test performance of ACSB (amplitude compandored single sideband), narrow band, and FM radios
[PB80-215932] N81-14217

SINGULARITY (MATHEMATICS)
On a class of nearly singular optimal control problems
[MC-TW-196/80] N81-14683

SINTERING
Mechanical characterization of Si3N4 N81-14005
Development of high performance sintered Si3N4
[AD-A091757] N81-14008

SITE SELECTION
Design and fabrication of terrestrial, photovoltaic solar generators for field testing in regions of intensive insolation
[BMFT-FB-T-79-34] N81-14400
Energy policy study. Volume 10: Nuclear power regulation
[DOE/EIA-0201/10] N81-14423
Coastal zone wind energy. Part 1: Synoptic and mesoscale controls and distributions of coastal wind energy
[DOE/ET-20274/7-PT-1] N81-14434
Comparative assessment of five potential sites for hydrothermal magma systems: Geochemistry --- The Geysers-Clear Lake region, Long Valley, Rio Grand Rift, Roosevelt Hot Springs, and the Salton Trough
[LBL-11410] N81-14471
Site insolation and wind power characteristics
[DOE/CS-20160/01-VOL-1] N81-14546
Site insolation and wind power characteristics: Technical report Midwest region
[DOE/CS-20160-01-VOL-4] N81-14586
Site insolation and wind power characteristics: Technical report Western region (south section)
[DOE/CS-20160-01-VOL-6] N81-14587
Site insolation and wind power characteristics: Technical report Western region (north section)
[DOE/CS-20160/01-VOL-5] N81-14588
Site insolation of wind power characteristics: Southern region
[DOE/CS-20160/01-VOL-3] N81-14589
Long-term high-level waste technology
[DOE/SR/WM-79/2] N81-14827

SKIN (STRUCTURAL MEMBER)
Fire extinguishing apparatus having a slidable mass for a penetrator nozzle --- for penetrating aircraft and shuttle orbiter skin
[NASA-CASE-KSC-11064-1] N81-14137

SKYLAB PROGRAM
Skylab orbital lifetime prediction and decay analysis
[NASA-TM-78308] N81-13979

SLEEVES
Fire extinguishing apparatus having a slidable mass for a penetrator nozzle --- for penetrating aircraft and shuttle orbiter skin
[NASA-CASE-KSC-11064-1] N81-14137

SLOTS
Method and tool for machining a transverse slot about a bore
[NASA-CASE-LAR-11855-1] N81-14319

SMOKE
Lidar observations at 0.7-micrometers and 10.6 micrometers wavelengths during smoke week 2
[AD-A091561] N81-14382
Assessment of the visibility impairment caused by the emissions from the proposed power plant at Boron, California
[NASA-CR-163103] N81-14504

SMOKE ABATEMENT
Reduction of exhaust smoke from gas-turbine engines by using fuel emulsions
[AD-A091777] N81-13953

SNOW
Microwave signatures of snow measured in Finland
[REPT-S-109] N81-14578

SOCIAL FACTORS
Conceptual framework for describing selected urban and community impacts of federal energy policies
[PNL-3492] N81-14929

SODIUM
Production technology of beta-alumina ceramics for Na/S batteries
[BMFT-FB-T-79-57] N81-14402

SODIUM NITRATES
Thermally stimulated discharge currents from sodium nitrate doped polyacrylonitrile
[AD-A091638] N81-14248

SOIL MOISTURE
One-dimensional simulation of temperature and moisture in atmospheric and soil boundary layers
[NASA-CR-163841] N81-14531

SOIL SCIENCE
Determination of soil properties from field observations of settlement
[PB80-213226] N81-14181

SOILS
Role of Organic Soils in the World Carbon: Problem Analysis and Research Needs
[DOE/EV-10040/2] N81-14516

SOLAR ARRAYS
Satellite Power System: Utility impact study
[EPRI-AP-1548] N81-14470

SOLAR CELLS
Method and apparatus for fabricating improved solar cell modules
[NASA-CASE-NPO-14416-1] N81-14389
Design and fabrication of terrestrial, photovoltaic solar generators for field testing in regions of intensive insolation
[BMFT-FB-T-79-34] N81-14400
Regional conceptual design and analysis studies for residential photovoltaic systems, volume 2
[SAND-78-7040/2] N81-14416
Amorphous thin films for solar cell application --- magnetron sputtering, ion implantation, and activation energy
[DOE/ET-23040/2] N81-14419
Thin film polycrystalline silicon solar cells
[DOE/ET-23047/4] N81-14420
Photovoltaic mechnisms in polycrystalline thin-films silicon solar cells
[DOE/ET-23108/5] N81-14440
Photovoltaic mechanisms in polycrystalline thin film solar cells
[DOE/ET-23106/2] N81-14441
Photovoltaic mechanisms in polycrystalline thin-film silicon solar cells
[DOE/ET-23108/3] N81-14442
Boron arsenide thin film solar cell development
[DOE/ET-23011/1] N81-14445

Thin film cadmium telluride solar cells
[DOE/ET-23009/T11] N81-14446
Decentralized solar photovoltaic energy systems
[DOE/EV-0101] N81-14451
Controlled cadmium telluride thin films for solar cells applications
[SERI/PR-9131-1-T1] N81-14482
SPS Energy Conversion Power Management Workshop
[NASA-CR-163840] N81-14491

SOLAR COLLECTORS
Outgassing tests on iras solar panel samples N81-14156
Annular solar receiver thermal characteristics
[SAND-79-1010] N81-14410
Development of sheet molding compound solar collectors with molded-in silvered glass reflective surfaces
[SAND-80-0702C] N81-14411
The effect of soiling on solar mirrors and techniques used to maintain high reflectivity
[SAND-79-2422] N81-14415
Solar photovoltaic/thermal residential experiment, phase 1
[DOE/ET-20279/103] N81-14437
The design construction and testing of a liquid-heating flat-plate solar collector
[DOE/CS-34223/T1] N81-14458
Low cost bare-plate solar air collector
[DOE/R5-10143/T1] N81-14465
Development of a low-cost black-liquid solar collector, phase 2
[DOE/CS-30171/2A] N81-14492
Information and guidelines for a proposed laboratory accreditation and product certification program for photovoltaic energy conversion systems
[PB80-217615] N81-14501

SOLAR COOLING
Solar heating, cooling and domestic hot water system installed at Columbia Gas System Service Corporation, Columbus, Ohio
[NASA-CR-161603] N81-14394
Solar energy: Program summary document
[DOE/CS-0050] N81-14428
Solar photovoltaic/thermal residential experiment, phase 1
[DOE/ET-20279/103] N81-14437
The characterization and assessment of selected solar thermal energy systems for residential and process heat applications
[DOE/EV-0102] N81-14452

SOLAR ENERGY
Solar central receiver in perspective
[SAND-79-2154C] N81-14414
Developing and upgrading of solar system thermal energy storage simulation models
[DOE/CS-34482/4] N81-14422
A multidisciplinary research program directed toward utilization of solar energy through bioconversion of renewable resources
[DOE/ER-00888/3] N81-14425
Technology characterizations: Environmental information handbook
[DOE/EV-0072] N81-14426
Solar thermal power systems
[DOE/CS-04042/1] N81-14429
Summary of solar energy technology characterizations
[DOE/EV-0099] N81-14450
The characterization and assessment of selected solar thermal energy systems for residential and process heat applications
[DOE/EV-0102] N81-14452
Demonstration of an advanced solar garden with a water ceiling
[DOE/R5-10122/2] N81-14459
Solar energy employment and requirements, 1978 - 1985. Summary and highlights
[DOE/TIC-1154] N81-14461
Distributed energy systems: A review of related technologies
[DOE/PE-03871/01] N81-14488
Solar thermal power systems
[DOE/CS-21036/01] N81-14489
Site insolation of wind power characteristics: Southern region
[DOE/CS-20160/01-VOL-3] N81-14589

SOLAR ENERGY ABSORBERS
Annular solar receiver thermal characteristics
[SAND-79-1010] N81-14410

SOLAR ENERGY CONVERSION
Decentralized solar photovoltaic energy systems
[DOE/EV-0101] N81-14451
Solar energy employment and requirements, 1978 - 1985. Summary and highlights
[DOE/TIC-1154] N81-14461
Residential heating costs: A comparison of geothermal solar and conventional resources
[PNL-3200] N81-14464
Community energy self-reliance
[SERI/CP-354-421] N81-14481
Quality-assurance needs and goals in solar energy conversion
[SERI/TP-641-773] N81-14483
Six kilowatt, residential photovoltaic power systems study; design, performance, economics, market potential
[UCID-18776] N81-14487

SOLAR FLARES
Studies of electrostatic double layers with applications to cosmic plasmas
[TRITA-EPP-80-03] N81-14861
Adiabatic and non-adiabatic processes in thermal models of solar hard X-ray bursts
[NASA-CR-163839] N81-14943

SOLAR FLUX DENSITY
Annular solar receiver thermal characteristics
[SAND-79-1010] N81-14410

SOLAR GENERATORS
A 25 kW solar photovoltaic flat panel power supply for an electrodialysis water desalination unit in New Mexico
[DOE/ET-23061/1] N81-14444

SOLAR HEATING
Solar heating, cooling, and domestic hot water system installed at Kaw Valley State Bank and Trust Company, Topeka, Kansas
[NASA-CR-161595] N81-14393
Solar heating, cooling and domestic hot water system installed at Columbia Gas System Service Corporation, Columbus, Ohio
[NASA-CR-161603] N81-14394
Development and preparation of industrial scale manufacturing processes for a modular solar-assisted house-heating-system, phase 2B
[BMFT-FB-T-79-85] N81-14407
Solar energy: Program summary document
[DOE/CS-0050] N81-14428
Solar photovoltaic/thermal residential experiment, phase 1
[DOE/ET-20279/103] N81-14437
The characterization and assessment of selected solar thermal energy systems for residential and process heat applications
[DOE/EV-0102] N81-14452
The design construction and testing of a liquid-heating flat-plate solar collector
[DOE/CS-34223/T1] N81-14458
Low cost bare-plate solar air collector
[DOE/R5-10143/T1] N81-14465
Quality-assurance needs and goals in solar energy conversion
[SERI/TP-641-773] N81-14483
Performance evaluation of a state-of-the-art solar air-heating system with auxiliary heat pump
[DOE/CS-30122/4] N81-14490

SOLAR PONDS (HEAT STORAGE)
Salt-gradient solar ponds: Design, construction and power production
[MLM-2770(OP)] N81-14409
Solar ponds. Citations from the Engineering Index data base
[PB80-814452] N81-14493
Solar ponds. Citations from the NTIS data base
[PB80-814460] N81-14494

SOLAR POWER SATELLITES
Control and dynamics study for the satellite power system. Volume 1: MPTS/SPS collector dynamic analysis and surface deformation
[NASA-CR-163826] N81-14395

SOLAR RADIATION
Estimates of incoming shortwave radiation and net radiation from standard meteorological data
[KNMI-WR-80-6] N81-14189
Site insolation and wind power characteristics
[DOE/CS-20160/01-VOL-1] N81-14546
Site insolation and wind power characteristics: Technical report Midwest region
[DOE/CS-20160-01-VOL-4] N81-14586
Site insolation and wind power characteristics: Technical report Western region (south section)
[DOE/CS-20160-01-VOL-6] N81-14587
Site insolation and wind power characteristics: Technical report Western region (north section)
[DOE/CS-20160/01-VOL-5] N81-14588
Solar energy meteorological research and training site, region 5
[DOE/ET-20172] N81-14590

SOLAR REFLECTORS
Solar mirror materials: Their properties and uses in solar concentrating collectors
[SAND-79-2190] N81-14412

SOLAR SIMULATION
P78-2 (SCATHA) satellite thermal balance test, a laboratory test N81-14162
Solar panel thermal cycling testing by solar simulation and infrared radiation methods N81-14164

SOLAR TOTAL ENERGY SYSTEMS
Energy analysis of solar energy systems, heat pumps and of improved insulation of single family houses
[BMFT-FB-T-79-101] N81-14403
Solar central receiver hybrid power system, phase 1. Volume 3: Appendices
[DOE/ET-21038/1-VOL-3] N81-14418
Solar thermal power systems
[DOE/CS-04042/1] N81-14429

SOLAR WIND
Interactions of surfaces with the solar plasma N81-14153
Enhanced interaction of the solar wind and the interstellar neutral gas by virtue of a critical velocity effect
[TRITA-EPP-79-19] N81-14942

SOLAR X-RAYS
Adiabatic and non-adiabatic processes in thermal models of solar hard X-ray bursts
[NASA-CR-163839] N81-14943

SOLID LUBRICANTS
Solid lubricants. Citations from the American Petroleum Institute data base
[PB80-816010] N81-14099
Solid lubricants. Citations from the NTIS data base
[PB80-815665] N81-14100
Solid lubricants: Graphite, polymers, fluorides, and general studies. Citations from the Engineering Index data base
[PB80-815673] N81-14101
Solid lubricants: Molybdenum compounds. Citations from the Engineering Index data base
[PB80-815681] N81-14102

SOLID PHASES
Mechanical properties of crystalline solids
[DOE/ER-02172/35] N81-14358

SOLID PROPELLANT IGNITION
Convective ignition of propellant cylinders in a developing cross-flow field
[AD-A091852] N81-14107

SOLID PROPELLANTS
Convective ignition of propellant cylinders in a developing cross-flow field
[AD-A091852] N81-14107
Stage 1 propellant, surveillance report glacial acrylic acid, motors GAA-001 and GAA-002, TP-H1011
[AD-A091707] N81-14110

SOLID ROCKET PROPELLANTS
Combustion mechanisms of solid propellants
[AD-A091857] N81-14108
Propellant surveillance report, LGM-30 F and G stage 1 phase G, series 1 TP-H1011
[AD-A091765] N81-14109
IUS solid rocket motor contamination prediction methods N81-14157

SOLID STATE DEVICES
A survey of concepts/techniques for sensing oxygen in aircraft oxygen-generating systems
[AD-A091667] N81-14038
Semiconductor crosspoints for direct replacement of electromechanical switches with high voltage requirements
[BMFT-FB-T-79-44] N81-14229

SOLID STATE LASERS
High power laser and materials investigation --- laser fusion
[DOE/DP-40054/1] N81-14307

SOLVENT REFINED COAL
Exploratory research on solvent refined coal liquefaction
[DOE/ET-14800/11] N81-14116
Exploratory research on solvent refined coal liquefaction
[DOE/ET-14800/13] N81-14117
SOLVENTS
Verification of selected solvent soluble coatings using production hybrid microcircuits
[AD-A091554] N81-14087
SONIC BOOMS
A study of the sonic-boom characteristics of a blunt body at a Mach number of 6
[NASA-TP-1787] N81-13915
SOOT
Fundamental characterization of alternate fuel effects in continuous combustion systems
[DOE/ET-11313/T1] N81-14042
SORBENTS
Support studies in fluidized-bed combustion
[PB80-218613] N81-14056
SORPTION
Systematic study of metal ion sorption on selected geologic media --- tracers for oil recovery systems
[DOE/BETC/OR-14] N81-14545
SOUND LOCALIZATION
Sound source location measurements on high speed trains
[DFVLR-MITT-79-15] N81-14791
SOUND PRESSURE
A preliminary analysis of the audible noise of constant speed, horizontal axis wind turbine generators
[DOE/EV-0089] N81-14799
SOUND TRANSMISSION
Activities of the Institute of Sound and Vibration Research for the year ending March 1980 N81-14960
SOUND WAVES
Prediction of sound radiated from different practical jet engine inlets
[NASA-CR-163824] N81-14789
Sound source location measurements on high speed trains
[DFVLR-MITT-79-15] N81-14791
SOUNDING ROCKETS
The swept angle retarding mass spectrometer: Initial results from the Michigan auroral probe sounding rocket
[NASA-TM-78317] N81-14530
SPACE CHARGE
Electrochromic glasses
[AD-A091641] N81-14088
Thermally stimulated discharge currents from sodium nitrate doped polyacrylonitrile
[AD-A091638] N81 14248
Three-dimensional space-charge calculation method
[LA-8531-MS] N81-14831
SPACE COOLING (BUILDINGS)
Solar heating, cooling, and domestic hot water system installed at Kaw Valley State Bank and Trust Company, Topeka, Kansas
[NASA-CR-161595] N81-14393
Two well storage systems for combined heating and airconditioning by groundwater heatpumps in shallow aquifers
[LBL-11302] N81-14472
SPACE ENVIRONMENT SIMULATION
Effectiveness of spacecraft testing programs N81-14140
Thermodynamic performance testing of the orbiter flash evaporator system N81-14143
Orbiter integrated active thermal control subsystem test N81-14144
Use of cryopumps on large space simulation systems N81-14145
The role of the real-time simulation facility, SIMFAC, in the design, development and performance verification of the Shuttle Remote Manipulator System (SRMS) with man-in-the-loop N81-14147
P78-2 (SCATHA) satellite thermal balance test, a laboratory test N81-14162
Thermal vacuum performance testing of the Space Shuttle Orbiter radiator system N81-14163
New methods to detect particle velocity and mass flux in arc-heated ablation/erosion facilities N81-14166
Space Shuttle Orbiter nose cap and wing leading edge certification test program N81-14168
SPACE FLIGHT STRESS
An interative approach to space-flight physiology using systems analysis and mathematical simulation N81-14151
SPACE HEATING (BUILDINGS)
Solar heating, cooling, and domestic hot water system installed at Kaw Valley State Bank and Trust Company, Topeka, Kansas
[NASA-CR-161595] N81-14393
Development and preparation of industrial scale manufacturing processes for a modular solar-assisted house-heating-system, phase 2B
[BMFT-FB-T-79-85] N81-14407
The design construction and testing of a liquid-heating flat-plate solar collector
[DOE/CS-34223/T1] N81-14458
An energy and cost analysis of residential heat pumps in northern climates
[DOE/TIC-11275] N81-14462
Residential heating costs: A comparison of geothermal solar and conventional resources
[PNL-3200] N81-14464
Low cost bare-plate solar air collector
[DOE/R5-10143/T1] N81-14465
Two well storage systems for combined heating and airconditioning by groundwater heatpumps in shallow aquifers
[LBL-11302] N81-14472
Performance evaluation of a state-of-the-art solar air-heating system with auxiliary heat pump
[DOE/CS-30122/4] N81-14490
Solar ponds. Citations from the Engineering Index data base
[PB80-814452] N81-14493
Geothermal energy development in the eastern Unites States geothermal space heating - Naval Air Rework Facility, Norfolk, Virginia
[PB80-217490] N81-14498
Geothermal energy development in the eastern United States. Geothermal space heating, Pittsville Middle/Elementary School, Pittsville, Maryland
[PB80-221088] N81-14499
SPACE MISSIONS
Advanced automation for space missions: Technical summary
[NASA-CR-163827] N81-14914
Department of Housing and Urban Development, and certain independent agencies appropriations, fiscal year 1981, part 2
[GPO-62-143] N81-14926
SPACE PLASMAS
Space plasma physics active experiments
[NASA-CP-2165] N81-14944
Spacelab experiment: ALAE, Atmospheric Lyman-Alpha Emissions N81-14945
Waves In Space Plasmas (WISP)
[WISP-336] N81-14953
The WISP/HF system for Spacelab N81-14954
SPACE PROGRAMS
Earth resources
[FOA-C-10148-M3] N81-14375
Space research activity in Italy. Report to COSPAR N81-14959
SPACE SHUTTLE BOOSTERS
Space shuttle solid rocket booster recovery subsystem
[NASA-TM-82389] N81-13990
SPACE SHUTTLE ORBITERS
The 11th Space Simulation Conference
[NASA-CP-2150] N81-14138
Pyrotechnic shock at the orbiter/external tank forward attachment N81-14142
Thermodynamic performance testing of the orbiter flash evaporator system N81-14143
Orbiter integrated active thermal control subsystem test N81-14144
The role of the real-time simulation facility, SIMFAC, in the design, development and performance verification of the Shuttle Remote Manipulator System (SRMS) with man-in-the-loop N81-14147
A radiant heating test facility for space shuttle orbiter thermal protection system certification N81-14149
STS-1 mission contamination evaluation approach N81-14154
Effects of the Shuttle Orbiter fuselage and elevon on the molecular distribution of water vapor from the flash evaporator system N81-14155
Thermal vacuum performance testing of the Space Shuttle Orbiter radiator system N81-14163
Space Shuttle Orbiter nose cap and wing leading edge certification test program N81-14168
SPACE SHUTTLES
Shuttle mission simulator N81-14148
Device for coupling a first vehicle to a second vehicle
[NASA-CASE-GSC-12429-1] N81-14320
Nonlinear dynamic response of a uni-directional model for the tile/pad space shuttle thermal protection system
[NASA-TM-81901] N81-14345
Fatigue properties of shuttle thermal protection system
[NASA-TM-81899] N81-14346
SPACE SIMULATORS
The 11th Space Simulation Conference
[NASA-CP-2150] N81-14138
SPACE TRANSPORTATION SYSTEM
Shuttle mission simulator N81-14148
STS-1 mission contamination evaluation approach N81-14154
SPACEBORNE ASTRONOMY
The faint object camera for the space telescope
[ESA-SP-1028] N81-14937
SPACEBORNE EXPERIMENTS
Space plasma physics active experiments
[NASA-CP-2165] N81-14944
Atmospheric Emission Photometric Imaging on Spacelab (AEPI) N81-14946
Measurement of visible and UV emission from Energetic Neutral Atom Precipitation (ENAP), on Spacelab N81-14948
Space Experiments with Particle Accelerators (SEPAC), status review, 23 September 1980 N81-14951
TEBPP: Theoretical and Experimental study of Beam-Plasma-Physics N81-14952
Waves In Space Plasmas (WISP)
[WISP-336] N81-14953
The WISP/HF system for Spacelab N81-14954
Magnetospheric multiprobes: Investigations and instrumentation N81-14955
A Recoverable Plasma Diagnostics Package (RPDP) for Spacelab N81-14956
Chemical release module facility N81-14957
Tether facility presentation N81-14958
SPACECRAFT
Water-deuterium oxide exchange in polymers used in spacecraft applications --- outgassing from Mylar and Kapton N81-14159
SPACECRAFT CONSTRUCTION MATERIALS
The identification of trends in outgassing technology N81-14160
SPACECRAFT CONTAMINATION
The 11th Space Simulation Conference
[NASA-CP-2150] N81-14138
Interactions of surfaces with the solar plasma N81-14153
STS-1 mission contamination evaluation approach N81-14154
IUS solid rocket motor contamination prediction methods N81-14157
SPACECRAFT CONTROL
Steering law for parallel mounted double-gimbaled control moment gyros. Revision A
[NASA-TM-82390] N81-13991
SPACECRAFT DESIGN
Effectiveness of spacecraft testing programs N81-14140
Vibration characteristics of a steadily rotating slender ring
[NASA-TP-1775] N81-14343
Control and dynamics study for the satellite power system. Volume 1: MPTS/SPS collector dynamic analysis and surface deformation
[NASA-CR-163826] N81-14395
Standard spacecraft procurement analysis: A case study in NASA-DoD coordination in space programs
[R-2619-RC] N81-14915
SPACECRAFT ELECTRONIC EQUIPMENT
The use of the principle of superposition in measuring and predicting the thermal characteristics of an electronic equipment operated in a space environment N81-14161
SPACECRAFT ENVIRONMENTS
Orbiter integrated active thermal control subsystem test N81-14144

SPACECRAFT INSTRUMENTS
Atmospheric Emission Photometric Imaging on Spacelab (AEPI) N81-14946
Wide angle Michelson Doppler imaging interferometer --- measuring atmospheric emissions N81-14949
Spacelab energetic ion mass spectrometer N81-14950

SPACECRAFT LAUNCHING
Tables of artificial satellites, 1979 [AERONOMICA-ACTA-F-30-1980] N81-13983

SPACECRAFT RADIATORS
Thermal vacuum performance testing of the Space Shuttle Orbiter radiator system N81-14163

SPACECRAFT REENTRY
New methods to detect particle velocity and mass flux in arc-heated ablation/erosion facilities N81-14166
Thermal stress response of General Purpose Heat Source (GPHS) aeroshell material N81-14167
Space Shuttle Orbiter nose cap and wing leading edge certification test program N81-14168

SPACECRAFT STRUCTURES
Outgassing tests on iras solar panel samples N81-14156
Solar panel thermal cycling testing by solar simulation and infrared radiation methods N81-14164

SPACELAB
Spacelab energetic ion mass spectrometer N81-14950

SPACELAB PAYLOADS
Space plasma physics active experiments [NASA-CP-2165] N81-14944
Space Experiments with Particle Accelerators (SEPAC), status review, 23 September 1980 N81-14951
TEBPP: Theoretical and Experimental study of Beam-Plasma-Physics N81-14952
Waves In Space Plasmas (WISP) [WISP-336] N81-14953
The WISP/HF system for Spacelab N81-14954
Magnetospheric multiprobes: Investigations and instrumentation N81-14955
A Recoverable Plasma Diagnostics Package (RPDP) for Spacelab N81-14956
Chemical release module facility N81-14957
Tether facility presentation N81-14958

SPALLING
Ceramic turbine components research and development. Part 2: Evaluation of MCrAlY/ZrO2 (Y2O3) thermal-barrier coatings exposed to simulated gas turbine environments [EPRI-AP-1539-PT-2] N81-14331

SPARK IGNITION
Advanced Technology Spark-Ignition Aircraft Piston Engine Design Study [NASA-CR-165162] N81-13963

SPATIAL DISTRIBUTION
Misspecification of trend in spatial random function interpolation with application to oxidant mapping [DOE/EV-02874/59] N81-14517
Time series in m dimensions: Spatial models [AD-A091734] N81-14773

SPATIAL FILTERING
Experimental and analytical development of the application of a transit laser velocimeter [AD-A091762] N81-14302

SPECIFICATIONS
DOE/DOD environmental data bank index --- numerical definitions of environments to which equipment is disposed [SAND-79-2130] N81-14506
Formal SEMANOL specification of Ada [AD-A091682] N81-14666

SPECTRAL BANDS
The relationship between differential areas and concentration in derivative absorption spectrophotometry [DRIC-TRANS-6127] N81-14029

SPECTRAL REFLECTANCE
Experimental sea slicks in the Marsen (Maritme Remote Sensing) exercise [AD-A091850] N81-14376

SPECTROHELIOGRAPHS
Photoheliographic results, 1972-1976 [ROG-13] N81-14941

SPECTROMETERS
Operation of multiwire drift chambers (MWDCs) in the QDD and QDQ focal planes [INTERIKO-80/1] N81-14290
Film transporting curved crystal X-ray spectrometer [SAND-80-1286] N81-14294
Investigation of nuclear structure and nuclear reactions induced by complex projectiles [DOE/ER-04052/T1] N81-14826

SPECTROPHOTOMETERS
Spacelab experiment: ALAE, Atmospheric Lyman-Alpha Emissions N81-14945

SPECTROSCOPIC ANALYSIS
Spectroscopic investigations and determination of the temperature distribution in a metal halide discharge lamp [NPL-QU-54] N81-14026
Infrared emission spectroscopy of low pressure gaseous discharges, 3 [AD-A091744] N81-14540

SPECTROSCOPY
On-line Zeeman atomic absorption spectroscopy for mercury analysis in oil shale gases [PB80-216922] N81-14055
Application of the shell model to nuclear spectroscopy [DOE/TIC-11287] N81-14828

SPECTRUM ANALYSIS
Stark cell optoacoustic detection of constituent gases in sample [NASA-CASE-NPO-14143-1] N81-14015
The relationship between differential areas and concentration in derivative absorption spectrophotometry [DRIC-TRANS-6127] N81-14029

SPECULAR REFLECTION
Solar mirror materials: Their properties and uses in solar concentrating collectors [SAND-79-2190] N81-14412
The effect of soiling on solar mirrors and techniques used to maintain high reflectivity [SAND-79-2422] N81-14415
Investigation of surface plasmon dispersion [AD-A091853] N81-14870

SPENT FUELS
Long-term high-level waste technology program: Strategy document [DOE/SR/WM-79/3-REV-4/80] N81-14829
Effects of dimensionality and boundary conditions on thermal calcuations [UCID-18681] N81-14911
The strategy for assessing the technical, environmental, and engineering feasibility of subseabed disposal [SAND-79-2245] N81-14927

SPHERICAL COORDINATES
Graphs of the three-dimensional state of stress at the vertex of a quarter-infinite crack in a half-space [NTHD-123] N81-14351

SPHERICAL HARMONICS
Numerical aspects of orbit computation using series of kernel functions [SER-A-89-MITT-155] N81-13980

SPHEROMAKS
Compact Toroid Theory Planning Workshop [DOE/ER-0062] N81-14873

SPILLING
A multifrequency evaluation of active and passive microwave sensors for oil spill detection and assessment N81-14152

SPIN EXCHANGE
Analysis of spectral diffusion of localized triplet spin transitions within an inhomogeneous profile [AD-A091714] N81-14033

SPIN-LATTICE RELAXATION
NMR of small platinum particles [DOE/ER-01198/1324] N81-14824

SPINE
Computerized tomographic determination of spinal bone mineral content [NASA-CR-160891] N81-14615

SPLINE FUNCTIONS
Three dimensional spline-generated coordinate transformations for grids around wing-body configurations N81-14707

SPLINES
Prevention of spline wear by soft metallic coatings --- aircraft engines [AD-A091861] N81-14064

SPOILERS
Theoretical investigation of the influence of spoiler dynamics on the handling qualities of an aircraft with direct lift control [DFVLR-FB-80-07] N81-13975

SPRAY NOZZLES
Fire extinguishing apparatus having a slidable mass for a penetrator nozzle --- for penetrating aircraft and shuttle orbiter skin [NASA-CASE-KSC-11064-1] N81-14137

SPUTTERING
Amorphous thin films for solar cell application --- magnetron sputtering, ion implantation, and activation energy [DOE/ET-23040/2] N81-14419
Controlled cadmium telluride thin films for solar cells applications [SERI/PR-9131-1-T1] N81-14482

STABILITY
Parametric study of the stability margins of cable-in-conduit superconductors: Experiment [CONF-800980-11] N81-14254
On V sub o stability of numerical methods for Volterra integral equations of the second kind [MC-NW-84/80] N81-14744

STABILITY AUGMENTATION
Economic evaluation of flying-qualities design criteria for a transport configured with relaxed static stability [NASA-TP-1760] N81-13968

STABILITY TESTS
Measurement of stability of cabled conductors cooled by He 1 at reduced temperature, or He 2 [GA-A-16012] N81-14255

STABILIZATION
NPL-PTB intercomparison of iodine-stabilized ion lasers [NPL-MOM-42] N81-14308

STABILIZED PLATFORMS
Development of an ASP (Air Stabilized Platform) [PB80-221997] N81-14183

STACKS
Development of molten carbonate fuel cell power plant technology [DOE/ET-15440/2] N81-14432

STAINLESS STEELS
Ultrasonic measurement of elastic moduli of 17-4 PH stainless steel and uranium - 2 molybdenum from minus 40 deg C to 800 deg C [SAND-80-1121] N81-14355
Characterization of extrinsic grain boundary dislocations and grain boundary dislocation sources by transmission electron microscopy [DOE/AL-10887] N81-14902

STANDARDIZATION
Codification of the high-temperature propellant TRHA [ESA-CR(P)-1374-VOL-1] N81-14106
U.S. metric board 1979 survey of selected large U.S. firms and industries [AD-A091618] N81-14178

STANDARDS
Development of MIL-HDBK-5 design allowable properties for several aerospace materials --- mechanical properties of 2024 T42 extrusion and Ti6Al2Sn4Zr2Mo duplex annealed sheet [AD-A091602] N81-14063
Specifications, tolerances, and other technical requirements for weighing and measuring devices. 1980 edition [PB80-213622] N81-14184
Multiparameter hypothesis testing and acceptance sampling [AD-A091607] N81-14340
Tables relating pure-tone audiometric threshold to age [NPL-AC-94] N81-14616
Distributed data processing standards forecast [PB80-216211] N81-14642
Prospectus for data dictionary system standard [PB80-225204] N81-14643
Datapoint 6600 COBOL 3.3 [PB80-219868] N81-14675
Sperry univac exec-8 operating system [PB80-219876] N81-14676

STARK EFFECT
Stark cell optoacoustic detection of constituent gases in sample [NASA-CASE-NPO-14143-1] N81-14015

STATIC PRESSURE
A study of the sonic-boom characteristics of a blunt body at a Mach number of 6
[NASA-TP-1787] N81-13915
STATISTICAL ANALYSIS
Handbook of satellite pointing errors and their statistical treatment
[ESS/SS-997] N81-13985
Propellant surveillance report, LGM-30 F and G stage 1 phase G, series 1 TP-H1011
[AD-A091765] N81-14109
Statistical relationship between median visibility and conditions of worstcase manmade impact on visibility
[LA-UR-80-2485] N81-14550
Long term variability of windspeed
[AD-A091802] N81-14581
Branching processes with continuous state space allowing immigration
[MC-SW-67/80] N81-14763
Minimum distance estimation and components of goodness of fit statistics
[AD-A091514] N81-14769
Methods in probability and statistical inference
[COO-2751-4] N81-14775
STATISTICAL TESTS
Behadur efficiency and small-sample efficiency: A numerical study
[MC-SW-68/80] N81-14764
STATISTICAL WEATHER FORECASTING
Very short range forecasts of visibility and ceiling N81-14570
The Eastern Pacific Tropical Cyclone Strike Probability Program (EPSTRKP)
[AD-A091841] N81-14579
STEADY STATE
Tables of homogeneous equilibrium critical flow parameters for water in SI units
[EGG-2056] N81-14280
Tokamak currents driven by weak electrostatic waves
[DOE/ET-53036/18] N81-14880
STEEL STRUCTURES
Fracture resistance of fatigue cracked welded details
[PB80-218217] N81-14336
Finite element analysis of time-dependent inelastic deformation in the presence of transient thermal stresses
[COO-2733-25] N81-14364
STEELS
Influences of gaseous environment on low growth-rate fatigue crack propagation in steels
[DOE/ER-10389/1] N81-14066
Study to optimize Cr-Mo steels to resist hydrogen and temper embrittlement
[DOE/ET-13513/T1] N81-14068
Fatigue threshold level in steel
[TRITA-HFL-0024] N81-14350
STELLAR EVOLUTION
Fragmentation in rotating isothermal protostellar clouds
[NASA-TM-82229] N81-14938
STELLAR MASS EJECTION
Nucleosynthesis of neutron-rich heavy nuclei during explosive helium burning in massive stars
[ATR-81(8454)-2] N81-14939
Effect of stellar structure on supernova remnant evolution
[LA-UR-80-2756] N81-14940
STELLAR STRUCTURE
Effect of stellar structure on supernova remnant evolution
[LA-UR-80-2756] N81-14940
STEREOPHOTOGRAPHY
Survey of CIG data base generation from imagery
[AD-A091508] N81-14923
STIMULI
Processing of sequential and holistic stimuli in left and right visual fields
[AD-A091588] N81-14619
STIRLING CYCLE
Development and demonstration of a Stirling/Rankine heat activated heat pump
[DOE/CS-20043/T1] N81-14283
Power control for hot gas engines
[NASA-CASE-NPO-14220-1] N81-14318
Applicability of advanced automotive heat engines to solar thermal power
[NASA-TM-81658] N81-14397
STOCHASTIC PROCESSES
Misspecification of trend in spatial random function interpolation with application to oxidant mapping
[DOE/EV-02874/59] N81-14517
On the performance of a modified sign detector for M-dependent data
[AD-A091570] N81-14771
Linear programming and undiscounted stochastic games in which one player controls transitions
[MC-BW-122/80] N81-14777
A time-discrete Boltzmann equation
[CTH-MATH-1980-1] N81-14782
STORAGE
Regenerative flywheel storage system, volume 2
[UCRL-15290-VOL-2] N81-14485
STORMS
AVE-SESAME IV: 25 mb sounding data
[NASA-TM-78315] N81-14553
STORMS (METEOROLOGY)
A preliminary look at AVE-SESAME 4 conducted on 9-10 May 1979
[NASA-TM-78314] N81-14552
Three-Hour rainfall required for flash flooding on small streams
[PB80-225576] N81-14596
STRATA
Electronic and optical properties and modeling of intercalated graphite
[AD-A091858] N81-14009
STRATIGRAPHY
Carolina Geological Society field trip guidebook, 11-12 October 1980. Geological investigations of Piedmont and triassic rocks, central North Carolina and Virginia (with a field trip guide on the bedrock geology of south central Virginia)
[DOE/SR-00001/T2] N81-14547
Applications of time series analysis to geophysical data
[PB80-213978] N81-14551
STRATOSPHERE
A new tropopause definition from simultaneous ozone temperature profiles
[AD-A091718] N81-14543
STRESS (PHYSIOLOGY)
An interative approach to space-flight physiology using systems analysis and mathematical simulation N81-14151
Stress factors on pilot performance. Citations from the International Aerospace Abstracts data base
[NASA-CR-163836] N81-14623
STRESS ANALYSIS
The stress behavior of three advanced nickel base superalloys during high temperature low cycle fatigue
[AD-A091694] N81-14061
Thermal stress response of General Purpose Heat Source (GPHS) aeroshell material N81-14167
The inelastic bending of a nickel beam at several temperatures: Experiment and prediction --- prismatic bars
[DOE/ER-02733/29] N81-14362
Solar central receiver hybrid power system, phase 1. Volume 3: Appendices
[DOE/ET-21038/1-VOL-3] N81-14418
STRESS CONCENTRATION
Refined theory for bending of perforated plates
[WTHD-125] N81-14352
Static and dynamic response of an aluminum alloy panel having a central opening with combined in-plane biaxial static loading and acoustic excitation
[ISVR-TR-103] N81-14353
STRESS CORROSION
Influences of gaseous environment on low growth-rate fatigue crack propagation in steels
[DOE/ER-10389/1] N81-14066
STRESS CYCLES
Influence of environment on constant load and fatigue crack propagation of titanium alloys Ti-6Al-4V and Ti-8Al-1Mo-1V
[DFVLR-FB-80-08] N81-14059
STRESS INTENSITY FACTORS
Stress intensity factors for cracks with circular and elliptic crack fronts, determined by 3D finite element methods --- corner, surface, and embedded cracks in cuboid blocks
[PNR-90035] N81-14349
Graphs of the three-dimensional state of stress at the vertex of a quarter-infinite crack in a half-space
[NTHD-123] N81-14351
STRESS-STRAIN-TIME RELATIONS
A boundary element formulation for planar time-dependent inelastic deformation of plates with cutouts
[DOE/ER-02733/26] N81-14359
Numerical analysis of planar, time-dependent inelastic deformation of plates with cracks by the boundary element method
[DOE/ER-02733/27] N81-14360
Boundary element analysis of time-dependent inelastic deformation of cracked plates loaded in anti-plane shear
[DOE/ER-02733/28] N81-14361
Mechanisms of damage accumulation in time-dependent cyclic deformation
[DOE/ER-10570/1] N81-14363
STRINGS
An overview of the summer programming language
[MC-IW-126/79] N81-14651
STRUCTURAL ANALYSIS
Pyrotechnic shock at the orbiter/external tank forward attachment N81-14142
STRUCTURAL DESIGN
A computer program for the design and analysis of low-speed airfoils, supplement
[NASA-TM-81862] N81-13921
Dual methods and approximation concepts in structural synthesis
[NASA-CR-3226] N81-14347
Predesign energy analysis: A new graphic approach to energy conscious design for buildings
[DOE/CS-0171] N81-14449
STRUCTURAL DESIGN CRITERIA
Clear air turbulence: Historical comments N81-14562
STRUCTURAL ENGINEERING
Some aspects of materials and structures engineering with ceramics for engine applications
[AD-A091547] N81-13967
Fatigue threshold level in steel
[TRITA-HFL-0024] N81-14350
STRUCTURAL MEMBERS
Design criteria for deflection capacity of conventionally reinforced concrete slabs. Phase 1: State-of-the-art report
[AD-A091738] N81-14175
Design criteria for deflection capacity of conventionall reinforced concrete slabs. Phase 2: Design and construction requirements
[AD-A091517] N81-14176
STRUCTURAL PROPERTIES (GEOLOGY)
Theoretical investigation of lunar and planetary interiors
[NASA-CR-163822] N81-14365
Convection, composition and the thermal state of the lower mantle N81-14366
Plate tectonics on Venus N81-14367
Carolina Geological Society field trip guidebook, 11-12 October 1980. Geological investigations of Piedmont and triassic rocks, central North Carolina and Virginia (with a field trip guide on the bedrock geology of south central Virginia)
[DOE/SR-00001/T2] N81-14547
STRUCTURAL STABILITY
Security assessment of power systems
[DOE/ET-29100/11] N81-14447
Development of empirical potential functions for the study of molecular geometry and applications to chlorophyll a dimers
[DOE/ER-02837-T1] N81-14810
STRUCTURAL STRAIN
Finite element analysis of time-dependent inelastic deformation in the presence of transient thermal stresses
[COO-2733-25] N81-14364
SUBMILLIMETER WAVES
Extended applicability of optical wind sensing techniques
[AD-A091606] N81-14582
SUBROUTINES
Optimal control nonlinear programming, spline interpolation, numerical software
[DFVLR-MITT-80-03] N81-14681
SUBSIDENCE
Determination of soil properties from field observations of settlement
[PB80-213226] N81-14181

SUBSONIC FLOW
Laser-Raman/Rayleigh flow diagnostic techniques applied to subsonic flow
[AD-A091695] N81-14275
SUBSTITUTES
Water-deuterium oxide exchange in polymers used in spacecraft applications --- outgassing from Mylar and Kapton N81-14159
SUBSTRATES
Bioconversion of biomass gasifier product gases to organic chemicals
[PB80-216641] N81-14135
Thin film cadmium telluride solar cells
[DOE/ET-23009/T11] N81-14446
SULFATES
The chemical composition of atmospheric precipitation in Minnesota and North Dakota
[DOE/EV-04327/1] N81-14510
SULFUR
Development of a simple fluidized-bed coal combustion model for the assessment of a pressurized fluidized-bed combustion system for electrical power generation
[DOE/METC/SP-80/15] N81-14044
Production technology of beta-alumina ceramics for Na/S batteries
[BMFT-FB-T-79-57] N81-14402
Electrochemical and surface analysis of the reactive interfaces in the Li (Si)/FeS2 primary battery
[SAND-79-2155] N81-14413
SULFUR DIOXIDES
Air chemistry measurements in the lower atmosphere over Sweden: Data evaluation
[AC-45] N81-14533
SULFUR FLUORIDES
Supplementary investigations to fundamental research program plasma techniques --- SF6 flow in a double nozzle circuit breaker model
[BMFT-FB-T-79-43] N81-14854
SUNLIGHT
Determination of the primary specular point in the sunglint pattern of a polar-orbiting satellite image
[AD-A091664] N81-13989
Design and fabrication of terrestrial, photovoltaic solar generators for field testing in regions of intensive insolation
[BMFT-FB-T-79-34] N81-14400
Site insolation of wind power characteristics: Southern region
[DOE/CS-20160/01-VOL-3] N81-14589
SUNSPOTS
Photoheliographic results, 1972-1976
[ROG-13] N81-14941
SUPERCONDUCTING MAGNETS
TPC magnet cryogenic system
[LBL-10552] N81-14179
Superconducting magnets. Citations from NTIS data base
[PB80-816028] N81-14262
Preconceptual design and assessment of a Tokamak hybrid reactor
[PNL-2720] N81-14883
SUPERCONDUCTIVITY
Measurement of stability of cabled conductors cooled by He 1 at reduced temperature, or He 2
[GA-A-16012] N81-14255
SUPERCONDUCTORS
Parametric study of the stability margins of cable-in-conduit superconductors: Experiment
[CONF-800980-11] N81-14254
Superconductor design and loss analysis for a 20 MJ induction heating coil
[LA-UR-80-2742] N81-14256
Ultrasonic attenuation in normal and superconducting indium
[AD-A091605] N81-14797
SUPERCRITICAL PRESSURES
A theory of droplet combustion at high pressures
[SAND-80-0081] N81-14040
SUPERNOVA REMNANTS
Effect of stellar structure on supernova remnant evolution
[LA-UR-80-2756] N81-14940
SUPERNOVAE
Nucleosynthesis of neutron-rich heavy nuclei during explosive helium burning in massive stars
[ATR-81(8454)-2] N81-14939
SUPERPOSITION (MATHEMATICS)
The use of the principle of superposition in measuring and predicting the thermal characteristics of an electronic equipment operated in a space environment N81-14161
SUPERSONIC FLIGHT
Computational aerodynamic design tools and techniques used at fighter development
[MBB-FE-122/S/PUB/13] N81-13950
SUPERSONIC FLOW
Downwash calculation at close range behind a trapezoidal wing in supersonic flow
[FFA-TN-AU-1661] N81-13925
Ion-exosphere with anisotropic velocity distribution
[AERONOMICA-ACTA-A-215-1980] N81-14527
SUPERSONIC SPEEDS
Theoretical prediction of the base pressure for two-dimensional turbulent base flows at supersonic velocities
[DFVLR-FB-80-19] N81-13928
SURFACE DISTORTION
Control and dynamics study for the satellite power system. Volume 1: MPTS/SPS collector dynamic analysis and surface deformation
[NASA-CR-163826] N81-14395
SURFACE ENERGY
An experimental study of unipolar arcs in a low pressure mercury discharge
[DOE/ET-51010/8] N81-14871
SURFACE FINISHING
Surface finishing
[NASA-CASE-MSC-12631-3] N81-14077
SURFACE LAYERS
Imaging of surfaces and defects of crystals
[DOE/ER-02995/4] N81-14903
SURFACE REACTIONS
Changes in surface chemistry of silicon carbide (0001) surface with temperature and their effect on friction
[NASA-TP-1756] N81-14079
Interactions of surfaces with the solar plasma N81-14153
SURFACE ROUGHNESS
A computer program for the design and analysis of low-speed airfoils, supplement
[NASA-TM-81862] N81-13921
SURFACE ROUGHNESS EFFECTS
The effects of shear and roughness on vortex shedding patterns behind a circular cylinder at critical Reynolds numbers --- ocean thermal energy conversion cold water pipes
[DOE/NOAA/OTEC-1] N81-14284
SURFACE TEMPERATURE
Thermal protection of reentry vehicles by actively cooled nosetips N81-14165
Errors associated with imperfect surfaces in standard hot-plate thermal conductivity measurements
[NPL-QU-57] N81-14170
SURFACE TO SURFACE MISSILES
A Monte Carlo model for determining copperhead probability of acquisition and maneuver
[AD-A091587] N81-13988
SURFACE WAVES
An analysis of the characteristics of Rayleigh waves produced by surface explosions
[AD-A091806] N81-14207
Applications of time series analysis to geophysical data
[PB80-213978] N81-14551
Investigation of surface plasmon dispersion
[AD-A091853] N81-14870
SURVEYS
U.S. metric board 1979 survey of selected large U.S. firms and industries
[AD-A091618] N81-14178
SUSPENDING (HANGING)
Steering law for parallel mounted double-gimbaled control moment gyros. Revision A
[NASA-TM-82390] N81-13991
SUSPENDING (MIXING)
Agglomeration in suspension: A study of mechanisms and kinetics
[WTHD-120] N81-14027
SWEDEN
Data obtained in radiowave propagation experiments on the path Kiruna Stockholm
[FOA-C-30187-E2] N81-14192
Air chemistry measurements in the lower atmosphere over Sweden: Data evaluation
[AC-45] N81-14533
SWEEP ANGLE
The swept angle retarding mass spectrometer: Initial results from the Michigan auroral probe sounding rocket
[NASA-TM-78317] N81-14530
SWEPT WINGS
The effects of warhead-induced damage on the aeroelastic characteristics of lifting surfaces. Volume 1: Aeroelastic effects
[AD-A091674] N81-13955
SWIRLING
Numerical computations of swirling recirculating flow
[NASA-CR-165196] N81-14267
SWITCHES
Development of technical integrated circuits
[BMFT-FB-T-79-41] N81-14228
SWITCHING THEORY
Telephone network behavior in repeated attempts environment: A simulation analysis
[FUB-15-1979] N81-14193
SYMBOLIC PROGRAMMING
The effects of symbology and spatial arrangement on the comprehension of software specifications
[AD-A091614] N81-14669
SYMBOLS
Feature tagging
[AD-A091691] N81-14378
SYNCHRONOUS SATELLITES
An analytical generator for drag-free satellite orbits
[RAE-TR-80085] N81-13981
SYNCHROTRON RADIATION
Instrumentation and controls of an ignited Tokamak
[ORNL/TM-7153] N81-14885
SYNOPTIC METEOROLOGY
Coastal zone wind energy. Part 1: Synoptic and mesoscale controls and distributions of coastal wind energy
[DOE/ET-20274/7-PT-1] N81-14434
SYNTHESIS (CHEMISTRY)
An analytical chemical system for the determination of heavy metals and organic compounds
[DOE/EV-04320/1] N81-14045
Improved polymers for enhanced oil recovery synthesis and rheology
[DOE/BETC-5603/10] N81-14089
SYNTHETIC APERTURE RADAR
Digital Data Recording System (DDRS) operating and maintenance manual
[NASA-CR-160894] N81-14288
SYNTHETIC FUELS
Synthetic fuels and the environment: An environmental and regulatory impact analysis
[DOE/EV-0087] N81-14122
Crossed reaction networks in the catalytic hydrodenitrogenation of synthetic liquid fuels
[DOE/PC-30094/1] N81-14124
Alternate fuels for industrial combustion engines. Report on task 018
[FE-2468-77] N81-14130
Efficient utilization of alternate fuels: Development of models for the prediction of interchangeability, design, and performance of gas burner/combustor systems
[PB80-218282] N81-14134
Catalytic combustion of coal-derived liquids
[NASA-TM-81594] N81-14396
Strategic cost-benefit analysis of energy policies: Comparative analysis
[BNL-51128] N81-14469
The environmental assessment of synfuels projects
[DOE/TIC-11286] N81-14512
Urban waste conversion systems --- operational problems and marketing
[DSE-5580-T1] N81-14931
SYRINGES
Micro-fluid exchange coupling apparatus
[NASA-CASE-ARC-11114-1] N81-14605
SYSTEM EFFECTIVENESS
Wind shear systems integration plan. VICON (visual confirmation) reliability analysis
[PB80-218233] N81-13949
SYSTEMS ANALYSIS
An interative approach to space-flight physiology using systems analysis and mathematical simulation N81-14151

Telephone network behavior in repeated attempts environment: A simulation analysis
[FUB-15-1979] N81-14193
Energy analysis of solar energy systems, heat pumps and of improved insulation of single family houses
[BMFT-FB-T-79-101] N81-14403
The RETE project. Integrated public and private cogeneration
[CISE-1527] N81-14406
Relevance of the second law of thermodynamics to energy conservation, volume 2
[DOE/CS-40178/1-VOL-2] N81-14906

SYSTEMS ENGINEERING
Microwave landing systems. Citations from the Engineering Index data base
[PB80-814643] N81-13947
Microwave landing systems. Citations from the NTIS data base
[PB80-814635] N81-13948
Comprehensive testing of a defense systems communications satellite N81-14139
An effective combined environment test facility N81-14150
Stragetic laser communications program. Volume 1: Proceedings of the Navy/DARPA Fourth Technical Interchange Meeting
[AD-A091619] N81-14201
Development of high complexity linear integrated circuits
[BMFT-FB-T-79-36] N81-14225
Superconductor design and loss analysis for a 20 MJ induction heating coil
[LA-UR-80-2742] N81-14256
Salt-gradient solar ponds: Design, construction and power production
[MLM-2770(OP)] N81-14409
Study of seed reprocessing systems for open cycle coal fired MHD power plants. Task 1: Selection of processes for more detailed study
[DOE/ET-15613/T1] N81-14435
Alternate central receiver power system program, phase 2. Volume 1: Commercial plant design refinement
[DOE/SF-10535/1-1] N81-14460
SPS Energy Conversion Power Management Workshop
[NASA-CR-163840] N81-14491
Fusion driver study --- pulsed lasers system for inertial confinement fusion
[DOE/DP-40006/1] N81-14872
Cost and schedule control systems criteria for contract performance measurement: Implementation guide
[DOE/CR-0015] N81-14917
The strategy for assessing the technical, environmental, and engineering feasibility of subseabed disposal
[SAND-79-2245] N81-14927
Space Experiments with Particle Accelerators (SEPAC), status review, 23 September 1980 N81-14951

SYSTEMS SIMULATION
Chaotically transitional phenomena in the forced negative-resistance oscillator --- systems simulation
[IJJP-482] N81-14842

T

TABLES (DATA)
Meteorological and oceanographic observations on board Netherlands light vessels and the light platform Goeree in the North Sea
[KNMI-141-27] N81-14370
Coordinated ionospheric and magnetospheric observations from the ISIS 2 satellite by the ISIS 2 experimenters. Volume 3: High-latitude charged particle, magnetic field, and ionospheric plasma observations during northern summer
[NASA-TM-82223] N81-14532
Occurrences of the polar slant E condition (SEC) at Marssarssuaq, Godhavn, Thule, 1978
[ISBN-87-7478-165-0] N81-14537
Seismological bulletin of the seismograph stations in the Netherlands, volume 63, 1975
[KNMI-108-63] N81-14538
Site insolation of wind power characteristics: Southern region
[DOE/CS-20160/01-VOL-3] N81-14589

TAKEOFF
Wind shear systems integration plan. VICON (visual confirmation) reliability analysis
[PB80-218233] N81-13949

TANTALUM
Integrated RC-circuits in ALTA-technology on one substrate
[BMFT-FB-T-79-107] N81-14227

TARGET ACQUISITION
A survey of simulation and test results for assessing RPV performance in a WBIC environment
[AD-A091603] N81-13954
A Monte Carlo model for determining copperhead probability of acquisition and maneuver
[AD-A091587] N81-13988

TARGETS
Recent advances in Pt coating of microspheres by a batch magnetron sputtering process
[UCRL-84478] N81-14074

TARS
Phase-equilibria for design of coal gasification processes. Dew points of hot gases containing condensible tars
[DOE/ET-10603/T1] N81-14120

TEARING MODE (PLASMAS)
Numerical study of explosive tearing mode instability in one-component plasmas
[IPPJ-486] N81-14844

TECHNOLOGICAL FORECASTING
Solar energy employment and requirements, 1978 - 1985. Summary and highlights
[DOE/TIC-1154] N81-14461

TECHNOLOGY ASSESSMENT
A survey of concepts/techniques for sensing oxygen in aircraft oxygen-generating systems
[AD-A091667] N81-14038
Opportunities for coal to methanol conversion
[DOE/CS-50009/01] N81-14113
Synthetic fuels and the environment: An environmental and regulatory impact analysis
[DOE/EV-0087] N81-14122
Coal Gasification Quarterly Report, April - June 1979
[DOE/FE-0002-79/2] N81-14126
Efficient utilization of alternate fuels: Development of models for the prediction of interchangeability, design, and performance of gas burner/combustor systems
[PB80-218282] N81-14134
Technology of machine tools, volume 1. Executive summary
[UCRL-52960-1] N81-14333
Technology of machine tools. Volume 4: Machine tool controls
[UCRL-52960-4] N81-14334
Conversion to coal and coal/oil firing
[ICTS/TR-07] N81-14405
Solar central receiver in perspective
[SAND-79-2154C] N81-14414
Regional conceptual design and analysis studies for residential photovoltaic systems, volume 2
[SAND-78-7040/2] N81-14416
Technology characterizations: Environmental information handbook
[DOE/EV-0072] N81-14426
Study of seed reprocessing systems for open cycle coal fired MHD power plants. Task 1: Selection of processes for more detailed study
[DOE/ET-15613/T1] N81-14435
Synthesis of research and development in mechanical energy storage technologies
[DOE/ET-16106/T1] N81-14439
Summary of solar energy technology characterizations
[DOE/EV-0099] N81-14450
Decentralized solar photovoltaic energy systems
[DOE/EV-0101] N81-14451
The characterization and assessment of selected solar thermal energy systems for residential and process heat applications
[DOE/EV-0102] N81-14452
Technology assessment of wind energy conversion systems
[DOE/EV-0103] N81-14453
Industrial application of geothermal energy in southeast Idaho
[DOE/ID-12010/4] N81-14454
Low energy futures for the United States
[DOE/PE-0020] N81-14456
Assessment of industrial activity in the utilization of biomass for energy
[DOE/PE-70090/01] N81-14457
Industrial cogeneration case studies
[EPRI-EM-1531] N81-14467
Satellite Power System: Utility impact study
[EPRI-AP-1548] N81-14470
Distributed energy systems: A review of related technologies
[DOE/PE-03871/01] N81-14488
Solar thermal power systems
[DOE/CS-21036/01] N81-14489
Geothermal energy development in the eastern Unites States geothermal space heating - Naval Air Rework Facility, Norfolk, Virginia
[PB80-217490] N81-14498
Geothermal energy development in the eastern United States. Geothermal space heating, Pittsville Middle/Elementary School, Pittsville, Maryland
[PB80-221088] N81-14499
Environmental impacts of the satellite power system (SPS) on the middle atmosphere
[NASA-TM-82228] N81-14508
Internal seismological stations for monitoring a comprehensive test ban theory
[FOA-C-20358-T1] N81-14535
Application of microprocessors in measurement
[CONF-801116-1] N81-14641
Advanced automation for space missions: Technical summary
[NASA-CR-163827] N81-14914

TECHNOLOGY TRANSFER
An assessment of General Aviation utilization of advanced avionics technology
[NASA-CR-159328] N81-13941
RSTS/E communications link via an asynchronous multiplexer
[ORNL/CSD/TM-128] N81-14670

TECHNOLOGY UTILIZATION
The future of civil turbo-fan engines
[PNR-90034] N81-13964
Earth resources
[FOA-C-10148-M3] N81-14375
Industrial application of geothermal energy in southeast Idaho
[DOE/ID-12010/4] N81-14454
The case against electric vehicles is running out of gas
[SAND-79-1770] N81-14928

TECTONICS
Theoretical investigation of lunar and planetary interiors
[NASA-CR-163822] N81-14365
Plate tectonics on Venus N81-14367

TELECOMMUNICATION
Light communication systems. Citations from the NTIS data base
[PB80-815319] N81-14218
Environmental assessment for the Satellite Power System. Concept development and evaluation program: Effects of ionospheric heating on telecommunications
[DOE/ER-10003/T2] N81-14507

TELEPHONES
Telephone network behavior in repeated attempts environment: A simulation analysis
[FUB-15-1979] N81-14193
Semiconductor crosspoints for direct replacement of electromechanical switches with high voltage requirements
[BMFT-FB-T-79-44] N81-14229

TELEVISION CAMERAS
Equipment for testing and measuring a 'helmet mounted sight and display' system with a coupled movable television camera in the flight-simulator for research of the DFVLR
[DFVLR-MITT-80-04] N81-13960

TELEVISION RECEIVERS
Integrated circuits for remote command and data transmission
[BMFT-FB-T-79-50] N81-14230

TELLURIUM ISOTOPES
Determination of neutron cross sections and resonance parameters for the osmium isotopes 186, 187, and 188. Tl-205, S-32, the stable tellurium isotopes and of the 82 keV inelastic cross section for U-238
[DOE/ER-02696/9] N81-14809

TEMPER (METALLURGY)
Study to optimize Cr-Mo steels to resist hydrogen and temper embrittlement
[DOE/ET-13513/T1] N81-14068
TEMPERATE REGIONS
Latent heat induced divergence and the ultra-long waves of the subtropics and midlatitudes
[AD-A091408] N81-14585
TEMPERATURE
Comparison of the temperature-dependent elastic modulus of TiFe with H-doped TiFe in the (111) direction
[AD-A091507] N81-14065
TEMPERATURE CONTROL
Performance of a flight qualified, thermoelectrically temperature controlled QCM sensor with power supply, thermal controller and signal processor N81-14158
A versatile microcomputer-based temperature controller
[SAND-79-2313] N81-14640
TEMPERATURE DISTRIBUTION
Spectroscopic investigations and determination of the temperature distribution in a metal halide discharge lamp
[NPL-QU-54] N81-14026
A quick accurate method for calculating temperatures arising from rectangular and circular microcircuit heat sources
[AWRE-O-30/80] N81-14241
Analytic solutions for thermal conduction from heat producing cylinders and spheres
[SAND-80-0039] N81-14277
Effects of dimensionality and boundary conditions on thermal calcuations
[UCID-18681] N81-14911
TEMPERATURE EFFECTS
The inelastic bending of a nickel beam at several temperatures: Experiment and prediction --- prismatic bars
[DOE/ER-02733/29] N81-14362
Research, development and demonstration of nickel-zinc batteries for electric vehicle propulsion
[ANL/OEPM-79-11] N81-14480
TEMPERATURE GRADIENTS
Primary calibrations of critical flow venturi nozzles in high-pressure gas
[NEL-666] N81-14270
TEMPERATURE MEASUREMENT
Some results on measurement of temperature and density in a flame by Raman spectroscopy N81-14019
The use of the principle of superposition in measuring and predicting the thermal characteristics of an electronic equipment operated in a space environment N81-14161
Microwave signatures of snow measured in Finland
[REPT-S-109] N81-14578
TEMPERATURE PROFILES
A new tropopause definition from simultaneous ozone temperature profiles
[AD-A091718] N81-14543
TENSILE PROPERTIES
Air oxidation and seawater corrosion Hastelloy S and Hastelloy C-4 --- storage capsules for radioisotope heat source fuel
[PNL-3344] N81-14072
TENSILE STRESS
Design criteria for deflection capacity of conventionall reinforced concrete slabs. Phase 2: Design and construction requirements
[AD-A091517] N81-14176
Static and dynamic response of an aluminum alloy panel having a central opening with combined in-plane biaxial static loading and acoustic excitation
[ISVR-TR-103] N81-14353
TENSOR ANALYSIS
An objective method for determining the generalized transport tensor for two dimensional Eulerian models
[AD-A091732] N81-14756
TERMINAL BALLISTICS
The effects of warhead-induced damage on the aeroelastic characteristics of lifting surfaces. Volume 1: Aeroelastic effects
[AD-A091674] N81-13955
TERNARY ALLOYS
Low alloy steels that minmize the hydrogen-carbide reaction, part 1
[DOE/ER 70296/T1] N81-14069
TERRAIN
Statistics of wind fluctuations over complex terrain
[DOE/ET-20560/1] N81-14593
TERRESTRIAL RADIATION
System techniques, satellites, orbit design, thermal control, power supply, attitude control, telemetry system
[DFVLR-FB-79-37] N81-13984
TEST EQUIPMENT
Equipment for testing and measuring a 'helmet mounted sight and display' system with a coupled movable television camera in the flight-simulator for research of the DFVLR
[DFVLR-MITT-80-04] N81-13960
Manufacturing methods and technology program automatic in-process microcircuit evaluation
[AD-A091854] N81-14243
TEST FACILITIES
The role of the real-time simulation facility, SIMFAC, in the design, development and performance verification of the Shuttle Remote Manipulator System (SRMS) with man-in-the-loop N81-14147
Advanced concepts test facility: Measurements and suggested test plan
[EPRI-CS-1530] N81-14466
Information and guidelines for a proposed laboratory accreditation and product certification program for photovoltaic energy conversion systems
[PB80-217615] N81-14501
TETHERED SATELLITES
Tether facility presentation N81-14958
TEXTS
An overview of the summer programming language
[MC-IW-126/79] N81-14651
THEOREM PROVING
Some notes on the gamma function
[FOA-C-10160-M8] N81-14751
THEORETICAL PHYSICS
Prospects for supergravity
[FERMILAB-CONF-80/74-THY] N81-14549
A note on Zeno's paradox in quantom theory
[DOE/ER-03992/387] N81-14909
A research program in theoretical high-energy physics
[COO-3130TA-352] N81-14912
THERMAL BATTERIES
Calcium/calcium chromate thermal battery and thermal battery assignment at the General Electric Neutron Devices Department
[GEPP-TIS-529] N81-14468
THERMAL CONDUCTIVITY
Errors associated with imperfect surfaces in standard hot-plate thermal conductivity measurements
[NPL-QU-57] N81-14170
Analytic solutions for thermal conduction from heat producing cylinders and spheres
[SAND-80-0039] N81-14277
THERMAL CONDUCTORS
Electrothermal response testing of electroexplosive devices with electrically conducting explosives
[SAND-80-0231] N81-14112
THERMAL CYCLING TESTS
Solar panel thermal cycling testing by solar simulation and infrared radiation methods N81-14164
THERMAL ENERGY
Developing and upgrading of solar system thermal energy storage simulation models
[DOE/CS-34482/4] N81-14422
Industrial application of geothermal energy in southeast Idaho
[DOE/ID-12010/4] N81-14454
Geothermal energy: Technology and general studies. Citations from the NTIS data base
[PB80-814676] N81-14497
THERMAL INSULATION
Installing fiber insulation
[NASA-CASE-MSC-16973-1] N81-14317
Energy analysis of solar energy systems, heat pumps and of improved insulation of single family houses
[BMFT-FB-T-79-101] N81-14403
THERMAL NEUTRONS
Development and application of the electrochemical etching technique
[DOE/EV-04814/T1] N81-14043
THERMAL PROTECTION
A radiant heating test facility for space shuttle orbiter thermal protection system certification N81-14149
Thermal protection of reentry vehicles by actively cooled nosetips N81-14165
Space Shuttle Orbiter nose cap and wing leading edge certification test program N81-14168
Nonlinear dynamic response of a uni-directional model for the tile/pad space shuttle thermal protection system
[NASA-TM-81901] N81-14345
Fatigue properties of shuttle thermal protection system
[NASA-TM-81899] N81-14346
THERMAL RESISTANCE
Errors associated with imperfect surfaces in standard hot-plate thermal conductivity measurements
[NPL-QU-57] N81-14170
Ceramic turbine components research and development. Part 2: Evaluation of MCrAlY/ZrO2 (Y2O3) thermal-barrier coatings exposed to simulated gas turbine environments
[EPRI-AP-1539-PT-2] N81-14331
THERMAL RESOURCES
Geothermal energy. Citations from the Engineering Index data base
[PB80-814692] N81-14495
THERMAL SHOCK
Pyrotechnic shock at the orbiter/external tank forward attachment N81-14142
THERMAL STABILITY
The compression moulding of composite aero engine components with elevated thermal stability
[PNR-90036] N81-13962
Thermal stress response of General Purpose Heat Source (GPHS) aeroshell material N81-14167
Heatshield material selection for advanced ballistic reentry vehicles --- rayon fiber cloth impregnated with phenolic resin N81-14169
Relation between weibel instability and magnetic field generating thermal instability
[IPPJ-485] N81-14843
THERMAL STRESSES
Finite element analysis of time-dependent inelastic deformation in the presence of transient thermal stresses
[COO-2733-25] N81-14364
THERMAL VACUUM TESTS
Thermodynamic performance testing of the orbiter flash evaporator system N81-14143
Orbiter integrated active thermal control subsystem test N81-14144
The identification of trends in outgassing technology N81-14160
P78-2 (SCATHA) satellite thermal balance test, a laboratory test N81-14162
Thermal vacuum performance testing of the Space Shuttle Orbiter radiator system N81-14163
THERMIONIC CONVERTERS
Application of microfabrication technology to thermionic energy conversion
[DOE/ET-15423/4] N81-14431
SPS Energy Conversion Power Management Workshop
[NASA-CR-163840] N81-14491
THERMIONIC EMISSION
Work function investigations at electrodes with adsorbed layers by measuring contact potential differences in vapor atmosphere
[DFVLR-FB-79-22] N81-14242
THERMOCOUPLES
Measurements of fluctuating density and temperature in an axisymmetric flame
[AASU-342] N81-14028
THERMODYNAMIC EFFICIENCY
A report on the relevance of the second law of thermodynamics to energy conservation
[PB80-216914] N81-14913
THERMODYNAMIC EQUILIBRIUM
Phase-equilibria for design of coal gasification processes. Dew points of hot gases containing condensible tars
[DOE/ET-10603/T1] N81-14120
Most probable ideal magnetohydrodynamic equilibria? 1: Tokamak regime and quasi-force-free states
[DOE/ET-53045/1] N81-14877
Equilibrium field coils for the Engineering Test Facility: Shaping the plasma cross section
[ORNL/TM-7339] N81-14886
THERMODYNAMIC PROPERTIES
Electrochromic glasses
[AD-A091641] N81-14088

Convection, composition and the thermal state of the lower mantle N81-14366

THERMODYNAMICS

Relevance of the second law of thermodynamics to energy conservation, volume 2
[DOE/CS-40178/1-VOL-2] N81-14906

THERMONUCLEAR REACTIONS

The development of fluorides for high power laser optics
[DOE/DP-40020/1] N81-14839

THERMOPLASTIC RESINS

The compression moulding of composite aero engine components with elevated thermal stability
[PNR-90036] N81-13962

A resin injection technique for the fabrication of aero engine composite components
[PNR-90024] N81-14004

Membrane consisting of polyquaternary amine ion exchange polymer network interpenetrating the chains of thermoplastic matrix polymer
[NASA-CASE-NPO-14001-1] N81-14076

THERMOSPHERE

Trace constituents in the middle atmosphere by high resolution UV spectroscopy N81-14947

THETA PINCH

Compact Toroid Theory Planning Workshop
[DOE/ER-0062] N81-14873

THIN FILMS

Partial interlaminar separation system for composites
[NASA-CASE-LAR-12065-1] N81-14000

A survey of concepts/techniques for sensing oxygen in aircraft oxygen-generating systems
[AD-A091667] N81-14038

The development of potential thin standards for calibration of X-ray fluorescence spectrometry
[PB80-220239] N81-14053

Crosslinking of aromatic polyamides via pendant propargyl groups
[NASA-TM-81918] N81-14080

Large-scale integrated MOS circuits with small dimensions. Preparation of thin films
[BMFT-FB-T-79-55] N81-14226

Amorphous thin films for solar cell application --- magnetron sputtering, ion implantation, and activation energy
[DOE/ET-23040/2] N81-14419

Thin film polycrystalline silicon solar cells
[DOE/ET-23047/4] N81-14420

Thin film cadmium telluride solar cells
[DOE/ET-23009/T10] N81-14438

Photovoltaic mechnisms in polycrystalline thin-films silicon solar cells
[DOE/ET-23108/5] N81-14440

Photovoltaic mechanisms in polycrystalline thin film solar cells
[DOE/ET-23106/2] N81-14441

Photovoltaic mechanisms in polycrystalline thin-film silicon solar cells
[DOE/ET-23108/3] N81-14442

Boron arsenide thin film solar cell development
[DOE/ET-23011/1] N81-14445

Thin film cadmium telluride solar cells
[DOE/ET-23009/T11] N81-14446

Controlled cadmium telluride thin films for solar cells applications
[SERI/PR-9131-1-T1] N81-14482

Production of optically thin free-standing oil films from the edge of a rotating disc --- liquid foils for ion accelerators
[DOE/ER-01388/457] N81-14840

THIN LAYER CHROMATOGRAPHY

Development and optimization of methodologies for analysis of complex hydrocarbon mixtures
[DOE/ER-10554-T1] N81-14114

THIN PLATES

Refined theory for bending of perforated plates
[WTHD-125] N81-14352

THIN WALLED SHELLS

Experiments with thin-walled, isotropic cones subjected to axial load, axial load combined with constant internal pressure and external hydrostatic pressure
[DFVLR-MITT-80-02] N81-14348

THOMSON SCATTERING

Design study for the JET diagnostic systems Quasi-Continuous Laser Scattering --- joint European Tokamak
[IPF-80-2] N81-14298

Time resolved Thomson scattering using a periodically emitting ruby laser --- for plasma diagnostics
[IPF-80-4] N81-14299

Electron heating and confinement measurements in EBT-S using Thompson scattering
[ORNL/TM-7437] N81-14887

THREE DIMENSIONAL BOUNDARY LAYER

Review of theoretical and experimental results on three dimensional turbulent wakes and boundary layers
[ONERA-NT-1980-4] N81-13930

Review of theoretical and experimental results on three-dimensional turbulent wakes and boundary layers
[ONERA-NT-1980-4] N81-14268

THREE DIMENSIONAL FLOW

Modifications to the Hess three-dimensional lifting body code to convert from CDC FORTRAN to IBM FORTRAN with reductions in core requirements and execution times N81-14647

Generations of orthogonal surface coordinates N81-14700

THRESHOLDS (PERCEPTION)

Tables relating pure-tone audiometric threshold to age
[NPL-AC-94] N81-14616

A literature study on visual motion accuity (minimum perceptible movement)
[DFVLR-MITT-80-06] N81-14618

THUNDERSTORMS

The microburst: Common factor in recent aircraft accidents N81-14571

Doctor Fujita's microburst analysis at Chicago N81-14572

Studies in objective forecasting of mesoscale weather using an interactive computer system
[AD-A091752] N81-14580

THYRISTORS

Novel production method for high-voltage semiconductor devices with greatest possible economy
[BMFT-FT-T-79-126] N81-14236

Optical triggering of power thyristors
[BMFT-FB-T-79-168] N81-14238

TIDES

Internal tides and inertial oscillations as inferred from current and temperature measurements in the equatorial Pacific
[PB80-225568] N81-14603

An explicit model for two-dimensional tidal circulation using triangular finite elements: WAVETL user's manual
[PB80-226046] N81-14604

TILES

Nonlinear dynamic response of a uni-directional model for the tile/pad space shuttle thermal protection system
[NASA-TM-81901] N81-14345

TIME

Time resolved Thomson scattering using a periodically emitting ruby laser --- for plasma diagnostics
[IPF-80-4] N81-14299

TIME DEPENDENCE

Grid generation for time dependent problems: Criteria and methods N81-14699

TIME OF FLIGHT SPECTROMETERS

A proposed neutron spectrometer system for JET
[TRITA-80-02] N81-14862

TIME SERIES ANALYSIS

Applications of time series analysis to geophysical data
[PB80-213978] N81-14551

General results, time series in M dimensions
[AD-A091578] N81-14766

Some simple examples of time series in M dimensions: An introduction
[AD-A091733] N81-14772

Time series in m dimensions: Spatial models
[AD-A091734] N81-14773

Random variate generation: A survey
[AD-A091343] N81-14774

TIME SHARING

Computer networks Citations from the NTIS data base
[PB80-814007] N81-14260

RSTS/E communications link via an asynchronous multiplexer
[ORNL/CSD/TM-128] N81-14670

TIME SIGNALS

Precise RF timing signal distribution to remote stations --- fiber optics
[NASA-CASE-NPO-14749-1] N81-14186

TITANIUM ALLOYS

Production of high purity metal and metal-alloy powders free of oxygen for subsequent processing of high-qualified sintering and semi-finished parts
[BMFT-FB-T-79-173] N81-14058

Influence of environment on constant load and fatigue crack propagation of titanium alloys Ti-6Al-4V and Ti-8Al-1Mo-1V
[DFVLR-FB-80-08] N81-14059

Determination of phase transformation temperatures of titanium-nickel using differential thermal analysis
[AD-A091792] N81-14062

Development of MIL-HDBK-5 design allowable properties for several aerospace materials --- mechanical properties of 2024 T42 extrusion and Ti6Al2Sn4Zr2Mo duplex annealed sheet
[AD-A091602] N81-14063

Comparison of the temperature-dependent elastic modulus of TiFe with H-doped TiFe in the (111) direction
[AD-A091507] N81-14065

Hot flow turning T-A6V titanium alloy
[PUR-90028] N81-14174

TOKAMAK DEVICES

Design study for the JET diagnostic systems Quasi-Continuous Laser Scattering --- joint European Tokamak
[IPF-80-2] N81-14298

Magnetic energy storage
[LA-UR-80-2589] N81-14473

Numerical simulation of density evolution in JIPP T-2 Tokamak
[IPPJ-483] N81-14841

Confinement and heating of plasmas
[ISSN-0547-1567] N81-14848

The measurement of the ion energy distribution and the hot ion density decay in torturi
[REPT-80-122] N81-14868

The ballooning mode second stability region for sequences of Tokamak equilibria
[DOE/ET-53073/T1] N81-14869

Most probable ideal magnetohydrodynamic equilibria? 1: Tokamak regime and quasi-force-free states
[DOE/ET-53045/1] N81-14877

Tokamak currents driven by weak electrostatic waves
[DOE/ET-53036/18] N81-14880

Experiments in the ISX-B Tokamak: ECRH ripple studies, pellet fueling, impurity flow reversal, and surface physics
[IAEA-CN-38/A-5] N81-14882

Preconceptual design and assessment of a Tokamak hybrid reactor
[PNL-2720] N81-14883

Instrumentation and controls of an ignited Tokamak
[ORNL/TM-7153] N81-14885

Currents induced in Tokamaks by electron cyclotron heating
[ORNL/TM-7503] N81-14888

Disruptive shift of magnetic axis noncircular Tokamaks
[PPPL-1707] N81-14889

Plasma Physics of Intense Neutral Beam heating in Tokamaks
[CONF-790463-2] N81-14890

TOLERANCES (MECHANICS)

Specifications, tolerances, and other technical requirements for weighing and measuring devices. 1980 edition
[PB80-213622] N81-14184

TOLUENE

Effect of fuel nitrogen and hydrogen content on emissions in hydrocarbon combustion
[NASA-TM-81612] N81-14399

TOMOGRAPHY

Computerized tomographic determination of spinal bone mineral content
[NASA-CR-160891] N81-14815

TOPOLOGY

Numerical grid generation techniques --- conference
[NASA-CP-2166] N81-14690

An electrostatic analog for generating cascade grids N81-14695

Component-adaptive grid embedding N81-14697
TORNADOES
An automated procedure for composition of severe weather watch areal redefining statements
[PB80-225584] N81-14595
TOROIDAL DISCHARGE
An experimental study of unipolar arcs in a low pressure mercury discharge
[DOE/ET-51010/8] N81-14871
Observations of neoclassical and anomalous resistivity in toroidal discharges
[DOE/ET-53051/4] N81-14879
Equilibrium field coils for the Engineering Test Facility: Shaping the plasma cross section
[ORNL/TM-7339] N81-14886
TOROIDAL PLASMAS
Forced and free magnetoacoustic oscillations of toroidal argon plasmas
[IPF-8-3] N81-14852
Linear mode conversion in a toroidal plasma
[TRITA-PFU-80-06] N81-14855
On plasma equilibrium in a poloidal magnetic field
[TRITA-PFU-80-03] N81-14863
On the energy principle for plasma MHD stability in presence of an inhomogeneous magnetic vacuum field
[TRITA-PFU-80-04] N81-14864
Observations of neoclassical and anomalous resistivity in toroidal discharges
[DOE/ET-53051/4] N81-14879
RMF concept: A rotating-magnetic-field technique for driving steady plasma currents in Compact Toroid devices
[LA-8516-MS] N81-14884
TOROIDS
Compact Toroid Theory Planning Workshop
[DOE/ER-0062] N81-14873
Equilibrium field coils for the Engineering Test Facility: Shaping the plasma cross section
[ORNL/TM-7339] N81-14886
TORQUE
Wind-tunnel test of an articulated helicopter rotor model with several tip shapes
[NASA-TM-80080] N81-13918
Torque ripple in a Darrieus, vertical axis wind turbine
[SAND-80-0475] N81-14417
Security assessment of power systems
[DOE/ET-29100/11] N81-14447
TOWERS
Advanced concepts test facility: Measurements and suggested test plan
[EPRI-CS-1530] N81-14466
TOXIC HAZARDS
Automated emergency meteorological response system
[DP-MS-80-81] N81-14592
TRACE CONTAMINANTS
An analytical chemical system for the determination of heavy metals and organic compounds
[DOE/EV-04320/3] N81-14046
Effects of several trace contaminants on fuel cell performance
[DOE/METC/RI-80/16] N81-14455
Trace metals and Stationary Conventional Combustion Processes. Volume 1: Technical report
[PB80-216161] N81-14519
Laser-photoacoustic detection of water pollutants, phase 1
[PB80-222250] N81-14524
TRACE ELEMENTS
An analytical chemical system for the determination of heavy metals and organic compounds
[DOE/EV-04320/1] N81-14045
Trace metals and Stationary Conventional Combustion Processes Volume 2: Bibliography
[PB80-216179] N81-14520
Trace constituents in the middle atmosphere by high resolution UV spectroscopy N81-14947
TRAILING EDGES
Downwash calculation at close range behind a trapezoidal wing in supersonic flow
[FFA-TN-AU-1661] N81-13925
TRAJECTORY ANALYSIS
Metric accuracy analysis
[AD-A091749] N81-13982
TRAJECTORY OPTIMIZATION
Evaluation of a computer-generated perspective tunnel display for flight path following
[NASA-TP-1736] N81-13958
TRANSFORMATIONS (MATHEMATICS)
An analytical transformation technique for generating uniformly spaced computational mesh
N81-14717
TRANSFORMERS
Base drive for paralleled inverter systems
[NASA-CASE-NPO-14163-1] N81-14220
TRANSISTOR CIRCUITS
FETSIM user's manual and example --- D.C. and transient analysis of MOS circuits
[NASA-CR-150800] N81-14222
TRANSISTORS
Base drive for paralleled inverter systems
[NASA-CASE-NPO-14163-1] N81-14220
Planar transistors and impatt diodes with ion implantation
[BMFT-FB-T-79-16] N81-14224
Medium power silicon transistors --- fabrication and assembling
[BMFT-FB-T-79-160] N81-14237
Advanced ion implantation techniques
[BMFT-FB-T-79-37] N81-14897
TRANSITION METALS
Investigation of electrochromic effects for display application
[BMFT-FB-T-79-42] N81-14022
TRANSMISSION EFFICIENCY
Use of amplitude compandored SSB in the mobile radio bands
[PB80-215791] N81-14212
Performance of the Gradient Adaptive Equalizer with Inherent Optimal Adjusting Step in Presence of Noise and Arithmetic Errors
[FUB-35-1979] N81-14240
Environmental assessment for the Satellite Power System. Concept development and evaluation program: Effects of ionospheric heating on telecommunications
[DOE/ER-10003/T2] N81-14507
TRANSMISSION LINES
Applications of multiconductor transmission line theory to the prediction of cable coupling: Volume 8. Prediction of cross talk involving braided shield cables
[AD-A091751] N81-14200
Study of electric field and ion effects on HVDC lines
[DOE/RA-50153/1] N81-14253
Magnetic energy storage
[LA-UR-80-2589] N81-14473
TRANSMISSIONS (MACHINE ELEMENTS)
Comparisons of modified Vasco X-2 and AISI 9310 gear steels
[NASA-TP-1731] N81-14322
Gas turbine engines and transmissions for bus demonstration programs
[COO-4867-07] N81-14329
TRANSMISSIVITY
The use of approximate expressions in power transmission spectrometry
[NPL-DES-64] N81-14024
TRANSMITTANCE
Negative ion chemistry in the terrestrial D-region and signal flow graph theory
[AERONOMICA-ACTA-A-217-1980] N81-14528
TRANSMUTATION
Homogeneous phosphorus of silicon by neutron transmutation
[BMFT-FB-T-79-52] N81-14898
TRANSONIC FLIGHT
An evaluation of wind tunnel test techniques for aircraft nozzle afterbody testing at transonic Mach numbers
[AD-A091775] N81-13931
TRANSONIC FLOW
Numerical solutions of the Navier-Stokes equations for transonic afterbody flows
[NASA-TP-1784] N81-13919
Investigation of a transonic flow oscillation by real-time laser Doppler anemometry
[DFVLR-FB-80-04] N81-13924
Component adaptive grid embedding N81-14697
An investigation into grid patching techniques N81-14708
TRANSONIC WIND TUNNELS
Further investigations of adaptive-wall wind tunnels
[AD-A091774] N81-13977
TRANSPORT AIRCRAFT
Fundamentals of conceptual design optimization of subsonic transport aircraft
[VTH-LR-292] N81-13951
Laminar-airfoils for transport aircraft
[DFVLR-MITT-80-07] N81-13952
Economic evaluation of flying-qualities design criteria for a transport configured with relaxed static stability
[NASA-TP-1760] N81-13968
Theoretical investigation of the influence of spoiler dynamics on the handling qualities of an aircraft with direct lift control
[DFVLR-FB-80-07] N81-13975
TRANSPORTATION
Overview of the environmental concerns of coal transportation
[ANL/EES/TM-99] N81-14515
Duality and the nonlinear roundtrip alpha center and covering problems on a tree
[MC-BW-123/80] N81-14778
TRANSPORTATION ENERGY
An experimental study of methanol reformation
[AD-A091412] N81-14111
Low energy futures for the United States
[DOE/PE-0020] N81-14456
TRAPEZOIDAL WINGS
Downwash calculation at close range behind a trapezoidal wing in supersonic flow
[FFA-TN-AU-1661] N81-13925
TRAPPED PARTICLES
Mixing length hypothesis in the dissipative trapped ion instability
[IPPJ-481] N81-14849
TRAVELING WAVES
Calculation of traveling-wave wire antenna arrays with mutual impedances
[REPT-S-111] N81-14191
Analysis of oscillations in the gyrotron traveling wave amplifier
[AD-A091586] N81-14246
TREES (MATHEMATICS)
Duality and the nonlinear roundtrip alpha center and covering problems on a tree
[MC-BW-123/80] N81-14778
TRIGGER CIRCUITS
Optical triggering of power thyristors
[BMFT-FB-T-79-168] N81-14238
TRITIUM
Combined Electrolysis Catalytic Exchange (CECE)
[MLM-2774] N81-14051
TROPICAL METEOROLOGY
Annual data and verification tabulation Atlantic tropical cyclones 1979
[PB80-226301] N81-14598
TROPICAL REGIONS
Latent heat induced divergence and the ultra-long waves of the subtropics and midlatitudes
[AD-A091408] N81-14585
TROPICAL STORMS
The Eastern Pacific Tropical Cyclone Strike Probability Program (EPSTRKP)
[AD-A091841] N81-14579
TROPOPAUSE
A new tropopause definition from simultaneous ozone temperature profiles
[AD-A091718] N81-14543
TROPOSPHERE
Monitoring pollutant gases from space using passive microwave techniques --- lowest layer of the troposphere
[NPL-QU-59] N81-14505
TROPOSPHERIC SCATTERING
Adaptive Antenna Control (AAC) program
[AD-A091764] N81-14197
Troposcatter antenna positioner
[AD-A091778] N81-14198
TUNABLE LASERS
Laser excitation of fluorescence in the A-X system of NH
[NASA-TM-82231] N81-14304
TUNGSTEN OXIDES
Electrochromic displays
[BMFT-FB-T-79-108] N81-14234
TURBINE BLADES
Hot corrosion/erosion testing of materials for application to advanced power conversion systems using coal-derived fuels Task 2: Fluidized bed combustion
[FE-2452-39] N81-14071

An electrostatic analog for generating cascade grids N81-14695

TURBINES
District heating/cogeneration application studies for Minneapolis-St. Paul area. Modifications of the existing units at the High Bridge Power Plant to cogeneration for hot water district heating
[ORNL/TM-6830/P9] N81-14474

TURBOFAN ENGINES
The future of civil turbo-fan engines
[PNR-90034] N81-13964

TURBOMACHINERY
Numerical methods in fluid flow problems. Citations from the NTIS data base
[PB80-814189] N81-14286

Evaluation of advanced hydraulic turbomachinery for underground pumped hydroelectric storage. Part 1: Single-stage regulated pump turbines for operating heads of 500 to 1000 m
[ANL/ES-100-PT-1] N81-14328

Fast Generation of body conforming grids for 3-D N81-14706

TURBOROCKET ENGINES
Regenerative engine analysis
[AD-A091755] N81-13965

TURBULENT BOUNDARY LAYER
Review of theoretical and experimental results on three dimensional turbulent wakes and boundary layers
[ONERA-NT-1980-4] N81-13930

Review of theoretical and experimental results on three-dimensional turbulent wakes and boundary layers
[ONERA-NT-1980-4] N81-14268

Statistics of wind fluctuations over complex terrain
[DOE/ET-20560/1] N81-14593

A new coordinate transformation for turbulent boundary layer flows N81-14702

TURBULENT FLOW
Theoretical prediction of the base pressure for two-dimensional turbulent base flows at supersonic velocities
[DFVLR-FB-80-19] N81-13928

Numerical computations of swirling recirculating flow
[NASA-CR-165196] N81-14267

The prediction of the flow and heat transfer in the vicinity of a jet in crossflow
[PNR-90025] N81-14271

Effects of downstream distance on turbulence decay for the compressor research facility low conditioning system
[AD-A091543] N81-14276

Analytical model for a vertical buoyant jet
[ORNL/TM-7140] N81-14513

TURBULENT JETS
Analytical model for a vertical buoyant jet
[ORNL/TM-7140] N81-14513

TURBULENT WAKES
Review of theoretical and experimental results on three dimensional turbulent wakes and boundary layers
[ONERA-NT-1980-4] N81-13930

Review of theoretical and experimental results on three-dimensional turbulent wakes and boundary layers
[ONERA-NT-1980-4] N81-14268

TWO DIMENSIONAL BOUNDARY LAYER
A new coordinate transformation for turbulent boundary layer flows N81-14702

TWO DIMENSIONAL FLOW
Theoretical prediction of the base pressure for two-dimensional turbulent base flows at supersonic velocities
[DFVLR-FB-80-19] N81-13928

SOLA-VOF: A solution algorithm for transient fluid flow with multiple free boundaries
[LA-8355] N81-14281

TWO PHASE FLOW
Studies of convective heat transfer coefficient enhancement in two-phase, non-boiling flow N81-14263

Two phase flow studies
[DOE/ET-27225/13] N81-14278

U

U.S.S.R.
Internal seismological stations for monitoring a comprehensive test ban theory
[FOA-C-20358-T1] N81-14535

ULCERS
Indometh acin-antihistamine combination for gastric ulceration control
[NASA-CASE-ARC-11118-2] N81-14613

ULTRAHIGH FREQUENCIES
Use of amplitude compandored SSB in the mobile radio bands
[PB80-215759] N81-14211

ULTRASONIC CLEANING
Ultrasonic cleaner evaluation
[GEPP-TIS-526] N81-14800

ULTRASONIC RADIATION
Ultrasonic attenuation in normal and superconducting indium
[AD-A091605] N81-14797

Measurement of the harmonic content across a bounded ultrasonic beam
[AD-A091646] N81-14798

ULTRASONIC TESTS
On the feasibility of quantitative ultrasonic determination of fracture toughness: A literature review
[NASA-CR-3356] N81-14337

ULTRASONICS
Ultrasonic aluminum wire bonding
[BDX-613-2485] N81-14330

Ultrasonic measurement of elastic moduli of 17-4 PH stainless steel and uranium - 2 molybdenum from minus 40 deg C to 800 deg C
[SAND-80-1121] N81-14355

Elastic moduli of boron carbide/copper composites from minus 40 deg C to 800 deg C by ultrasonic methods
[SAND-80-0881] N81-14356

ULTRAVIOLET LASERS
Ultraviolet lasers. Citations from the International Aerospace Abstracts data base
[NASA-CR-163831] N81-14314

ULTRAVIOLET RADIATION
Neutron radiation effects in fiber optics
[AD-A091661] N81-14838

ULTRAVIOLET SPECTRA
Measurement of visible and UV emission from Energetic Neutral Atom Precipitation (ENAP), on Spacelab N81-14948

ULTRAVIOLET SPECTROSCOPY
Photoelectron photoion molecular beam spectroscopy
[LBL-11434] N81-14820

Trace constituents in the middle atmosphere by high resolution UV spectroscopy N81-14947

UNDERGROUND STORAGE
Underground natural gas storage in the United States 1979 - 1980 heating year
[DOE/EIA-0239/79] N81-14421

Synthesis of research and development in mechanical energy storage technologies
[DOE/ET-16106/T1] N81-14439

UNITED STATES OF AMERICA
Geothermal energy development in the eastern United States: Evaluation of potential geothermal resource areas
[PB80-212806] N81-14386

Underground natural gas storage in the United States 1979 - 1980 heating year
[DOE/EIA-0239/79] N81-14421

UNSTEADY FLOW
Investigation of a transonic flow oscillation by real-time laser Doppler anemometry
[DFVLR-FB-80-04] N81-13924

Statistics of wind fluctuations over complex terrain
[DOE/ET-20560/1] N81-14593

UPPER ATMOSPHERE
Upper atmospheric winds
[AERONOMICA-ACTA-A-219-1980] N81-14529

URANIUM
Ultrasonic measurement of elastic moduli of 17-4 PH stainless steel and uranium - 2 molybdenum from minus 40 deg C to 800 deg C
[SAND-80-1121] N81-14355

URANIUM 238
Determination of neutron cross sections and resonance parameters for the osmium isotopes 186, 187, and 188, Tl-205, S-32, the stable tellurium isotopes and of the 82 keV inelastic cross section for U-238
[DOE/ER-02696/9] N81-14809

URBAN DEVELOPMENT
Department of Housing and Urban Development, and certain independent agencies appropriations, fiscal year 1981, part 2
[GPO-62-143] N81-14926

URBAN PLANNING
Community energy self-reliance
[SERI/CP-354-421] N81-14481

Urban air pollution. Citations from the NTIS data base
[PB80-814411] N81-14526

URBAN TRANSPORTATION
Gas turbine engines and transmissions for bus demonstration programs
[COO-4867-07] N81-14329

Urban air pollution. Citations from the NTIS data base
[PB80-814411] N81-14526

USER MANUALS (COMPUTER PROGRAMS)
A system for aerodynamic design and analysis of supersonic aircraft. Part 2: User's manual
[NASA-CR-3352] N81-13920

FETSIM user's manual and example --- D.C. and transient analysis of MOS circuits
[NASA-CR-150800] N81-14222

Air Force runoff model (AFRUM) user manual documentation
[AD-A091717] N81-14380

An explicit model for two-dimensional tidal circulation using triangular finite elements: WAVETL user's manual
[PB80-226046] N81-14604

Floppy disk utility user's guide
[NASA-CR-160889] N81-14648

Ada compiler validation implementers' guide
[AD-A091760] N81-14660

S2KPLOT/DOEPLOT, implementation and programmers manual
[PB80-219926] N81-14671

USER REQUIREMENTS
A PASCAL processor validation suite
[NPL-CSU-7/80] N81-14654

UTILITIES
Commercialization strategy for lead/acid batteries in utility load leveling applications
[DOE/ET-26934/1] N81-14448

V

VACUUM
On the energy principle for plasma MHD stability in presence of an inhomogeneous magnetic vacuum field
[TRITA-PFU-80-04] N81-14864

VACUUM CHAMBERS
Use of cryopumps on large space simulation systems N81-14145

VACUUM MELTING
Comparisons of modified Vasco X-2 and AISI 9310 gear steels
[NASA-TP-1731] N81-14322

VACUUM SPECTROSCOPY
Photoelectron photoion molecular beam spectroscopy
[LBL-11434] N81-14820

VALUE ENGINEERING
Alternate central receiver power system program, phase 2. Volume 1: Commercial plant design refinement
[DOE/SF-10535/1-1] N81-14460

VALVES
An investigation of a digital electrohydraulic servovalve
[AD-A091563] N81-14326

VANADIUM COMPOUNDS
Vanadium trineodecanoate promoter for fiberglass-polyester soil surfacings
[AD-A091785] N81-14084

VAPOR DEPOSITION
Basic concepts for integrated RC networks and hybrid circuits on organic substrate foils
[BMFT-FB-T-79-87] N81-14231

Work function investigations at electrodes with adsorbed layers by measuring contact potential differences in vapor atmosphere
[DFVLR-FB-79-22] N81-14242

Passivation of silicon power devices by thermal oxidation
[BMFT-FB-T-79-48] N81-14401

Thin film cadmium telluride solar cells
[DOE/ET-23009/T10] N81-14438

Thin film cadmium telluride solar cells
[DOE/ET-23009/T11] N81-14446

VAPOR PHASES

Vapor-liquid critical properties
[NPL-CHEM-107] N81-14021

VARIABILITY

Changes of psychometric coefficients and factor structure as a function of test practice
[DFVLR-FB-80-15] N81-14622

VECTOR ANALYSIS

Application of vector performance optimization to a robust control loop design for a fighter aircraft
[DFVLR-FB-80-14] N81-13970

Gauge theories and spontaneous symmetry breaking
[AD-A091800] N81-14804

VECTORS (MATHEMATICS)

On the correspondence between two-dimensional real vector functions and functions of a complex variable and its application in electromagnetics
[REPT-S-112] N81-14223

VELOCITY

Technical and management support for the development of small wind systems
[RFP-3126/3533/80/2] N81-14475

VELOCITY DISTRIBUTION

Ion-exosphere with anisotropic velocity distribution
[AERONOMICA-ACTA-A-215-1980] N81-14527

VELOCITY MEASUREMENT

Rocket sled improved velocity measuring system feasibility study
[AD-A091634] N81-13978

A crosswind measurement module for the model 2 optical C sub n-2 instrument
[PB80-217607] N81-14600

VENTILATION FANS

Noise and noise abatement in fans and blowers: A review
[DFVLR-FB-80-16] N81-14796

VENUS (PLANET)

Plate tectonics on Venus N81-14367

VERTEBRAE

Computerized tomographic determination of spinal bone mineral content
[NASA-CR-160891] N81-14615

VERTICAL AIR CURRENTS

One-dimensional simulation of temperature and moisture in atmospheric and soil boundary layers
[NASA-CR-163841] N81-14531

VERTICAL DISTRIBUTION

Statistics of wind fluctuations over complex terrain
[DOE/ET-20560/1] N81-14593

VIBRATION

Activities of the Institute of Sound and Vibration Research for the year ending March 1980 N81-14960

VIBRATION DAMPING

Passive control of wing/store flutter
[NASA-TM-81865] N81-13922

VIBRATION MODE

Vibration characteristics of a steadily rotating slender ring
[NASA-TP-1775] N81-14343

VIBRATION TESTS

Technical and management support for the development of small wind systems
[RFP-3126/3533/80/2] N81-14475

VINYL POLYMERS

Verification of selected solvent soluble coatings using production hybrid microcircuits
[AD-A091554] N81-14087

VIRGINIA

Carolina Geological Society field trip guidebook, 11-12 October 1980. Geological investigations of Piedmont and triassic rocks, central North Carolina and Virginia (with a field trip guide on the bedrock geology of south central Virginia)
[DOE/SR-00001/T2] N81-14547

VISCOELASTIC DAMPING

Joining of ceramics for high performance energy systems
[DOE/ET-15359/1] N81-14092

VISCOUS FLOW

Generation of C-type cascade grids for viscous flow computation N81-14721

VISIBILITY

Assessment of the visibility impairment caused by the emissions from the proposed power plant at Boron, California
[NASA-CR-163103] N81-14504

Visibility in California
[PB80-216765] N81-14518

Statistical relationship between median visibility and conditions of worstcase manmade impact on visibility
[LA-UR-80-2485] N81-14550

Ceiling and visibility instrumentation within government agencies N81-14565

Very short range forecasts of visibility and ceiling N81-14570

VISIBLE SPECTRUM

Measurement of visible and UV emission from Energetic Neutral Atom Precipitation (ENAP), on Spacelab N81-14948

VISUAL ACUITY

Processing of sequential and holistic stimuli in left and right visual fields
[AD-A091588] N81-14619

VISUAL DISCRIMINATION

A literature study on visual motion accuity (minimum perceptible movement)
[DFVLR-MITT-80-06] N81-14618

VISUAL FLIGHT

Midair and near midair collisions on two- and three-dimensional curvilinear flight paths
[DFVLR-FB-80-13] N81-13944

A literature study on visual motion accuity (minimum perceptible movement)
[DFVLR-MITT-80-06] N81-14618

VISUAL PERCEPTION

Processing of sequential and holistic stimuli in left and right visual fields
[AD-A091588] N81-14619

Survey of CIG data base generation from imagery
[AD-A091508] N81-14923

VLASOV EQUATIONS

Stability analysis of cylindrical Vlasov equilibria
[DOE/ET-53051/113] N81-14895

VOLCANOLOGY

Basaltic volcanism contribution N81-14369

VOLTERRA EQUATIONS

Linear multistep methods and the construction of quadrature formulae for Volterra integral and integro-differential equations
[MC-NW-76/79] N81-14733

Volterra integral equations and semigroups of operators
[MC-TW-197/80] N81-14740

Superconvergence in collocation and implicit Runge-Katta methods for Volterra-type integral equations of the second kind
[MC-NW-80/80] N81-14743

On V sub o stability of numerical methods for Volterra integral equations of the second kind
[MC-NW-84/80] N81-14744

Analysis of estimation errors in the identification of nonlinear systems
[RR-115] N81-14776

Identification of nonlinear systems using parameter estimation techniques
[RR-117] N81-14779

VOLTMETERS

Electrochemical methods of chemical analysis. Citations from the NTIS data base
[PB80-815053] N81-14057

VORTICES

Experimental study of supersonic viscous leeside flow over a slender delta wing
[NASA-TM-81248] N81-14265

The effects of shear and roughness on vortex shedding patterns behind a circular cylinder at critical Reynolds numbers --- ocean thermal energy conversion cold water pipes
[DOE/NOAA/OTEC-1] N81-14284

W

WALL PRESSURE

An investigation of turbulent wall-pressure fluctuations in a pipe downstream of an abrupt enlargement of its cross-sectional area
[DFVLR-FB-80-11] N81-14273

WALLS

An experimental study of unipolar arcs in a low pressure mercury discharge
[DOE/ET-51010/8] N81-14871

WARNING SYSTEMS

Automated emergency meteorological response system
[DP-MS-80-81] N81-14592

An automated procedure for composition of severe weather watch areal redefining statements
[PB80-225584] N81-14595

WASTE DISPOSAL

Design considerations for a thermal decomposition analytical system
[PB80-219116] N81-14054

An evaluation of emission factors for waste-to-energy systems
[PB80-226665] N81-14521

Long-term high-level waste technology
[DOE/SR/WM-79/2] N81-14827

Long-term high-level waste technology program: Strategy document
[DOE/SR/WM-79/3-REV-4/80] N81-14829

Nevada Nuclear Waste Storage Investigations: Quality
[NVO-196-17] N81-14830

Effects of dimensionality and boundary conditions on thermal calcuations
[UCID-18681] N81-14911

The strategy for assessing the technical, environmental, and engineering feasibility of subseabed disposal
[SAND-79-2245] N81-14927

WASTE ENERGY UTILIZATION

Synthesis of research and development in mechanical energy storage technologies
[DOE/ET-16106/T1] N81-14439

Low energy futures for the United States
[DOE/PE-0020] N81-14456

Industrial cogeneration case studies
[EPRI-EM-1531] N81-14467

An evaluation of emission factors for waste-to-energy systems
[PB80-226665] N81-14521

WASTE UTILIZATION

Urban waste conversion systems --- operational problems and marketing
[DSE-5580-T1] N81-14931

WATER

Tables of homogeneous equilibrium critical flow parameters for water in SI units
[EGG-2056] N81-14280

WATER CONSUMPTION

Network flow optimization for water resources planning with uncertainties in supply and demand
[PB80-221161] N81-14934

WATER HEATING

Solar heating, cooling, and domestic hot water system installed at Kaw Valley State Bank and Trust Company, Topeka, Kansas
[NASA-CR-161595] N81-14393

Solar heating, cooling and domestic hot water system installed at Columbia Gas System Service Corporation, Columbus, Ohio
[NASA-CR-161603] N81-14394

The characterization and assessment of selected solar thermal energy systems for residential and process heat applications
[DOE/EV-0102] N81-14452

Demonstration of an advanced solar garden with a water ceiling
[DOE/R5-10122/2] N81-14459

District heating/cogeneration application studies for Minneapolis-St. Paul area. Modifications of the existing units at the High Bridge Power Plant to cogeneration for hot water district heating
[ORNL/TM-6830/P9] N81-14474

Performance evaluation of a state-of-the-art solar air-heating system with auxiliary heat pump
[DOE/CS-30122/4] N81-14490

WATER MANAGEMENT
Network flow optimization for water resources planning with uncertainties in supply and demand
[PB80-221161] N81-14934
WATER POLLUTION
Determination of atmospheric phosphorous addition to Lake Michigan
[PB80-219124] N81-14385
Remote sensing applied to pollution monitoring. Citations from the International Aerospace Abstracts data base
[NASA-CR-163830] N81-14388
Overview of the environmental concerns of coal transportation
[ANL/EES/TM-99] N81-14515
Trace metals and Stationary Conventional Combustion Processes. Volume 1: Technical report
[PB80-216161] N81-14519
Laser-photoacoustic detection of water pollutants, phase 1
[PB80-222250] N81-14524
WATER RESOURCES
California Water Resources Center: chronicle of research, 1957-1980 --- bibliographies
[PB80-222276] N81-14384
WATER RUNOFF
ARID zone geosystems
[AD-A091689] N81-14379
Air Force runoff model (AFRUM) user manual documentation
[AD-A091717] N81-14380
Three-Hour rainfall required for flash flooding on small streams
[PB80-225576] N81-14598
WATER TREATMENT
Membrane consisting of polyquaternary amine ion exchange polymer network interpenetrating the chains of thermoplastic matrix polymer
[NASA-CASE-NPO-14001-1] N81-14076
A 25 kW solar photovoltaic flat panel power supply for an electrodialysis water desalination unit in New Mexico
[DOE/ET-23061/1] N81-14444
WATER VAPOR
Effects of the Shuttle Orbiter fuselage and elevon on the molecular distribution of water vapor from the flash evaporator system N81-14155
WATER WAVES
Catalog of sea state and wind speed in the South Atlantic Bight
[NASA-CR-156872] N81-14601
Preliminary results on a comparison of shallow water wave predictions
[KNML-WR-80-5] N81-14602
WATERSHEDS
ARID zone geosystems
[AD-A091689] N81-14379
Air Force runoff model (AFRUM) user manual documentation
[AD-A091717] N81-14380
WAVE DEGRADATION
Performance degradation of a 7400 TTL NAND gate due to sinusoidal interference
[AD-A091745] N81-14249
WAVE DIFFRACTION
Exhaust noise in flight: The role of acoustic installation effects
[PNR-90029] N81-14793
WAVE DISPERSION
Applications of time series analysis to geophysical data
[PB80-213978] N81-14551
Investigation of surface plasmon dispersion
[AD-A091853] N81-14870
WAVE EXCITATION
Experiment on magnetoacoustic mode excitation in FIVA device
[TRITA-PFU-80-08] N81-14867
WAVE PROPAGATION
Evaporation duct effects on maximum intercept range for 18-1 and 37.5-GHz emitters. A theoretical analysis of expected frequency distributions of intercept range for five oceanic areas
[AD-A091724] N81-14205
On a new series of integrable nonlinear evolution equations
[IPPJ-484] N81-14846
Wave propagation in a deuterium-hydrogen-oxygen plasma in the range of ion cyclotron frequencies
[IPF-80-5] N81-14853
Properties of a fluctuating double layer in a magnetized plasma column
[TRITA-EPP-80-02] N81-14860
WAVEFORMS
Lead acid battery pulse discharge investigation
[DOE/CH-00128/1] N81-14427
A two-stage nonrecursive filter/decimator
[SAND-80-0891] N81-14639
Improvements in the digitizing of analogue information
[TDB-343] N81-14919
WAVEGUIDE ANTENNAS
Calculation of traveling-wave wire antenna arrays with mutual impedances
[REPT-S-111] N81-14191
WAVEGUIDES
Coaxial phased array antenna
[NASA-CASE-MSC-16800-1] N81-14187
Measurements of microwave transmission characteristics through various configurations of fluidized bed materials
[DOE/MC-14143/T1] N81-14208
Analysis method of the spatio-temporal structure of an acoustic field in the air with the aid of its optical Fourier transform
[ISL-CO-219/79] N81-14787
WEAR
Improved capabilities to detect incipient bearing failures
[AD-A091687] N81-14325
WEAR INHIBITORS
Prevention of spline wear by soft metallic coatings --- aircraft engines
[AD-A091861] N81-14064
WEAR TESTS
Prevention of spline wear by soft metallic coatings --- aircraft engines
[AD-A091861] N81-14064
WEATHER
Measuring weather for aviation safety in the 1980's N81-14568
WEATHER FORECASTING
Federal Aviation Administration and National Weather Service Aviation Research and Development N81-14558
Clear air turbulence forecasting techniques N81-14573
The program of the Techniques Development Laboratory in aviation weather forecasting N81-14574
Studies in objective forecasting of mesoscale weather using an interactive computer system
[AD-A091752] N81-14580
Three-Hour rainfall required for flash flooding on small streams
[PB80-225576] N81-14598
Annual data and verification tabulation Atlantic tropical cyclones 1979
[PB80-226301] N81-14598
A computer program for determining and displaying the geostrophic winds on Lakes Superior and Michigan
[PB80-225675] N81-14599
WEATHER STATIONS
Visibility in California
[PB80-216765] N81-14518
Federal Aviation Administration and National Weather Service Aviation Research and Development N81-14558
WEATHERING
DOE/DOD environmental data bank index --- numerical definitions of environments to which equipment is disposed
[SAND-79-2130] N81-14508
WEIGHT (MASS)
Current aircraft survey (approach speeds, gross weights, and Dimensions)
[PB80-225691] N81-13956
WEIGHT INDICATORS
Specifications, tolerances, and other technical requirements for weighing and measuring devices. 1980 edition
[PB80-213622] N81-14184
WEIGHTING FUNCTIONS
The weighted linear least squares problem: An interval analysis approach to rank determination
[SAND-80-1260] N81-14757
WEIGHTLESSNESS SIMULATION
Shuttle remote manipulator system hardware test facility N81-14146
WELD STRENGTH
Statistical evaluation of J sub c in a 533-B weld metal and heat affected zone
[TRITA-HFL-0026] N81-14323
WELD TESTS
Fracture resistance of fatigue cracked welded details
[PB80-218217] N81-14336
WET CELLS
Development of molten carbonate fuel cell power plant technology
[DOE/ET-15440/2] N81-14432
Effects of several trace contaminants on fuel cell performance
[DOE/METC/RI-80/16] N81-14455
WIDEBAND COMMUNICATION
Horn antenna design studies. Citations from the International Aerospace Abstract data base
[NASA-CR-163820] N81-14219
WIND (METEOROLOGY)
Evaluation of atmospheric density models and preliminary functional specifications for the Langley Atmospheric Information Retrieval System (LAIRS)
[NASA-CR-159374] N81-14554
Winds and wind shear in-situ sensors N81-14563
Remote probing of wind and wind shears N81-14564
Site insolation of wind power characteristics: Southern region
[DOE/CS-20160/01-VOL-3] N81-14589
WIND DIRECTION
Low-speed wind-tunnel tests of two weathercocking sensors
[WSRL-0171-TM] N81-14575
Remote sensing of wind speed and direction by laser Doppler anemometer
[DFVLR-MITT-79-18] N81-14576
WIND MEASUREMENT
Remote probing of wind and wind shears N81-14564
Some considerations about wind predictions over sea using a 'limited area model' based on primitive equations
[KNMI-V-349] N81-14577
Solar energy meteorological research and training site, region 5
[DOE/ET-20172] N81-14590
Meteorological measurement system for support of atmospheric propagation studies
[UCRL-84547] N81-14594
A computer program for determining and displaying the geostrophic winds on Lakes Superior and Michigan
[PB80-225675] N81-14599
A crosswind measurement module for the model 2 optical C sub n-2 instrument
[PB80-217607] N81-14600
WIND PROFILES
Statistics of wind fluctuations over complex terrain
[DOE/ET-20560/1] N81-14593
WIND SHEAR
Winds and wind shear in-situ sensors N81-14563
The microburst: Common factor in recent aircraft accidents N81-14571
Doctor Fujita's microburst analysis at Chicago N81-14572
WIND TUNNEL STABILITY TESTS
Low-speed wind-tunnel tests of two weathercocking sensors
[WSRL-0171-TM] N81-14575
WIND TUNNEL TESTS
Wind-tunnel test of an articulated helicopter rotor model with several tip shapes
[NASA-TM-80080] N81-13918
Passive control of wing/store flutter
[NASA-TM-81865] N81-13922
Rotary balance data for a single-engine agricultural airplane configuration for an angle-of-attack range of 8 deg to 90 deg
[NASA-CR-3311] N81-13923
An evaluation of wind tunnel test techniques for aircraft nozzle afterbody testing at transonic Mach numbers
[AD-A091775] N81-13931
Evaluation of wind tunnel nozzle afterbody test techniques utilizing a modern twin engine fighter geometry at Mach numbers from 0.6 to 1.2 --- YF-17 aircraft
[AD-A091545] N81-13932

Advanced ejection seat for high dynamic pressure escape. Wind tunnel test
[AD-A091810] N81-13940
Active control of an explosive wing-store flutter case
[MBB-FE-17/S/PUB/25] N81-13973
Wind tunnel tests of a Gerdien capacitor vehicle combination
[AD-A091719] N81-13986
Heat-transfer tests on a full and 1/4 scale aim-9E sidewinder missile and a 1/15 scale GBU-8 guided bomb unit at Mach numbers 1.5, 2.0 and 2.5
[AD-A091805] N81-13987
Thermal analysis of proposed W81 heatshield materials flown on a Malemute system
[SAND-79-2417] N81-14013
Laser-Raman/Rayleigh flow diagnostic techniques applied to subsonic flow
[AD-A091695] N81-14275
Hot film anemometry. Citations from the NTIS data base
[PB80-814288] N81-14297

WIND TUNNEL WALLS
Further investigations of adaptive-wall wind tunnels
[AD-A091774] N81-13977

WIND TUNNELS
A computer-based laser Doppler velocimeter
[DFVLR-MITT-79-14] N81-14289

WIND VARIATIONS
Coastal zone wind energy. Part 1: Synoptic and mesoscale controls and distributions of coastal wind energy
[DOE/ET-20274/7-PT-1] N81-14434
Security assessment of power systems
[DOE/ET-29100/11] N81-14447
Site insolation and wind power characteristics
[DOE/CS-20160/01-VOL-1] N81-14546
Site insolation and wind power characteristics: Technical report Midwest region
[DOE/CS-20160-01-VOL-4] N81-14586
Site insolation and wind power characteristics: Technical report Western region (south section)
[DOE/CS-20160-01-VOL-6] N81-14587
Site insolation and wind power characteristics: Technical report Western region (north section)
[DOE/CS-20160/01-VOL-5] N81-14588

WIND VELOCITY
Long term variability of windspeed
[AD-A091802] N81-14581
A crosswind measurement module for the model 2 optical C sub n-2 instrument
[PB80-217607] N81-14600
Catalog of sea state and wind speed in the South Atlantic Bight
[NASA-CR-156872] N81-14601

WIND VELOCITY MEASUREMENT
Upper atmospheric winds
[AERONOMICA-ACTA-A-219-1980] N81-14529
Remote sensing of wind speed and direction by laser Doppler anemometer
[DFVLR-MITT-79-18] N81-14576
Extended applicability of optical wind sensing techniques
[AD-A091606] N81-14582

WINDING
Development of a high energy density capacitor for plasma thrusters
[AD-A091839] N81-13995

WINDMILLS (WINDPOWERED MACHINES)
A general calculation method for the dynamic response to discrete gust distributions as exemplified by the rotorblade of a wind energy converter
[DFVLR-FB-80-12] N81-14408

WINDOWS (APERTURES)
The use of magnesium fluoride windows in an argon wall-stabilized mini-arc
[NPL-QU-58] N81-14171

WINDPOWER UTILIZATION
Torque ripple in a Darrieus, vertical axis wind turbine
[SAND-80-0475] N81-14417
Solar energy: Program summary document
[DOE/CS-0050] N81-14428
Coastal zone wind energy. Part 1: Synoptic and mesoscale controls and distributions of coastal wind energy
[DOE/ET-20274/7-PT-1] N81-14434
Technology assessment of wind energy conversion systems
[DOE/EV-0103] N81-14453
Technical and management support for the development of small wind systems
[RFP-3126/3533/80/2] N81-14475
Technical and management support for the development of small wind systems: FY 1980 program summary
[RFP-3121/3533/80/8] N81-14476
Site insolation and wind power characteristics
[DOE/CS-20160/01-VOL-1] N81-14546
Site insolation and wind power characteristics: Technical report Midwest region
[DOE/CS-20160-01-VOL-4] N81-14586
Site insolation and wind power characteristics: Technical report Western region (south section)
[DOE/CS-20160-01-VOL-6] N81-14587
Site insolation and wind power characteristics: Technical report Western region (north section)
[DOE/CS-20160/01-VOL-5] N81-14588
Site insolation of wind power characteristics: Southern region
[DOE/CS-20160/01-VOL-3] N81-14589

WINDPOWERED GENERATORS
Torque ripple in a Darrieus, vertical axis wind turbine
[SAND-80-0475] N81-14417
Security assessment of power systems
[DOE/ET-29100/11] N81-14447
Technology assessment of wind energy conversion systems
[DOE/EV-0103] N81-14453
Technical and management support for the development of small wind systems
[RFP-3126/3533/80/2] N81-14475
Technical and management support for the development of small wind systems: FY 1980 program summary
[RFP-3121/3533/80/8] N81-14476
A preliminary analysis of the audible noise of constant speed, horizontal axis wind turbine generators
[DOE/EV-0089] N81-14799

WINDS ALOFT
Upper atmospheric winds
[AERONOMICA-ACTA-A-219-1980] N81-14529

WING LOADING
Effects of nonlinearities on wing store flutter
[MBB-FE-17/S/PUB/27] N81-13974

WING PLANFORMS
Laminar-airfoils for transport aircraft
[DFVLR-MITT-80-07] N81-13952

WINGS
Space Shuttle Orbiter nose cap and wing leading edge certification test program N81-14168

WIRE
Ultrasonic aluminum wire bonding
[BDX-613-2485] N81-14330

WIRE BRIDGE CIRCUITS
On the improvement of miniature pyrotechnic devices for space application
[ESA-CR(P)-1296] N81-14105

WOOD
Progress in wood gasification at the University of Missouri-Rolla
[CONF-800973-1] N81-14128

WOODEN STRUCTURES
Structural wood panels with improved fire resistance
[NASA-CASE-ARC-11174-1] N81-13999

WORK FUNCTIONS
Work function investigations at electrodes with adsorbed layers by measuring contact potential differences in vapor atmosphere
[DFVLR-FB-79-22] N81-14242

X

X RAY ANALYSIS
An X-ray photoelectron spectroscopic examination of surfaces of some thermosetting resins and carbon fibre composites
[RAE-TM-MAT-347] N81-14007
Electron microprobe mineral analysis guide
[NASA-CR-160895] N81-14018
Computerized tomographic determination of spinal bone mineral content
[NASA-CR-160891] N81-14615

X RAY ASTRONOMY
Activities during 1979: Astronomical Research
[ISSN-0531-4496] N81-14936

X RAY FLUORESCENCE
The development of potential thin standards for calibration of X-ray fluorescence spectrometry
[PB80-220239] N81-14053

X RAY LASERS
X-ray lasers. Citations from the International Aerospace Abstracts data base
[NASA-CR-163834] N81-14315

X RAY SPECTRA
Film transporting curved crystal X-ray spectrometer
[SAND-80-1286] N81-14294

X RAY SPECTROSCOPY
The development of potential thin standards for calibration of X-ray fluorescence spectrometry
[PB80-220239] N81-14053

XENON
Some necessary parameters for a critical velocity interaction between the ionospheric plasma and a Xenon cloud
[TRITA-EPP-79-20] N81-14857

Y

YAG LASERS
Neodymium YAG lasers. Citations from the International Aerospace Abstracts data base
[NASA-CR-163835] N81-14316

YIELD
Pressure harvesting of microalgae
[PB80-221781] N81-14609

YIELD STRENGTH
The development of fluorides for high power laser optics
[DOE/DP-40020/1] N81-14839

Z

ZEEMAN EFFECT
On-line Zeeman atomic absorption spectroscopy for mercury analysis in oil shale gases
[PB80-216922] N81-14055

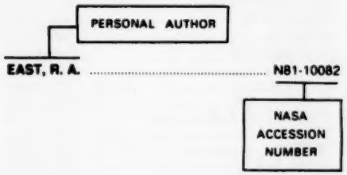
ZINC
Research on alkaline zinc secondary electrodes with emphasis on model
[DOE/RL-90369/8] N81-14257

ZINC OXIDES
Measurement techniques for high power semiconductor materials and devices
[PB80-217623] N81-14261

ZIRCONIUM OXIDES
Electrochromic displays
[BMFT-FB-T-79-108] N81-14234

PERSONAL AUTHOR INDEX

Typical Personal Author Index Listing



Listings in this Index are arranged alphabetically by personal author. The NASA accession number denotes the number by which the citation is identified.

A

AASE, D. T. N81-14883
ABLOW, C. M. N81-14694
ABRAMS, M. L. N81-14432
ACKERMAN, H. N81-14305
ACKERSON, K. L. N81-14956
ADAMCZYK, J. J. N81-14695
ADAMS, N. J. N81-14661
ADICOFF, A. N81-14084
AFENDYKIW, M. N81-14244
AKAMATSU, N. N81-14842
AKERS, J. W. N81-14648
ALBE, F. N81-14300
ALBERS, M. N81-13924
ALCORN, J. S. N81-14255
ALCORTA, J. A. N81-14325
ALESSANDRETTI, G. N81-14019
ALGER, D. L. N81-14397
ALIA, P. N81-14406
ALKALAY, J. N81-14249
ALLEMANN, R. T. N81-14466
ALLEN, J. E., JR. N81-14303
ALLRED, R. E. N81-14411
ALTAVILLA, P. A. N81-13953
ALTSTATT, M. C. N81-14433
AMBROSE, D. N81-14021
AMBROSIANO, J. N81-14877
N81-14878
AMBROSIUS, B. A. C. N81-14194
N81-14373
AMOS, J. C. N81-14460
ANDERSON, D. A. N81-14196
N81-14719
ANDERSON, D. L. N81-14365
N81-14367
N81-14368
N81-14369
ANDERSON, D. N. N81-14398
ANDERSON, D. R. N81-14927
ANDERSON, H. R. N81-14952
ANDERSON, J. M. N81-14251
ANDERSON, M. N81-14661
ANDERSON, P. G. N81-14696
ANDERSON, R. R. N81-14956
ANDERSON, W. R. N81-14303
N81-14304
ANDERSON, W. W. N81-14419
ANDREWS, W. H. N81-14296
ARAVIND, P. K. N81-14896
ARENDTS, F. J. N81-14006
ARIKAWA, T. N81-14847
ARKERYD, L. N81-14782
ARMENTANO, T. V. N81-14516
ARMSTRONG, N. R. N81-14413
N81-14901
ARNAUD, J. L. N81-14300
ARNURIUS, D. A. N81-14882
AROIAN, L. A. N81-14786
N81-14772
N81-14773
ARONSON, J. E. N81-14916
ASHARE, E. N81-14121
ASHBY, G. C., JR. N81-13915
ASHOK, S. N81-14441
ASVELD, P. R. J. N81-14658
ATREYA, S. K. N81-14947
ATTA, E. H. N81-14697
ATTIG, R. C. N81-14433
AUERBACH, I. N81-14013
AUPOIX, B. N81-13930
N81-14268
AXNAES, I. N81-14857
N81-14942
AZZOLINI, M. C. N81-14632

B

BACK, R. J. R. N81-14650
BAECHLE, E. N81-14229
BAECKLUND, L. N81-14192
BAER, J. N81-14307
BAER, M. R. N81-14040
BAILEY, R. N81-13969
BAKER, A. J. N81-14698
BAKKER, M. N81-14730
BALCKWOOD, T. R. N81-14521
BALDRIDGE, W. S. N81-14471
BALDWIN, D. E. N81-14894
BALLUFFI, R. W. N81-14905
BANKS, C. N81-14836
BANKS, H. T. N81-14686
BANKS, P. M. N81-14946
N81-14958
BARGER, W. R. N81-14376
BARKAN, P. N81-14251
BARNARD, G. W. N81-14135
BARNES, R. M. N81-14045
N81-14046
BARNETT, L. N81-14246
BARR, W. L. N81-14893
BARRICK, J. D. N81-14080
BARTHOLOMEW, C. H. N81-14118
BASSETT, R. R. N81-14928
BATDORF, J. A. N81-14454
BATES, S. C. N81-14882
BAUCUM, W. E. N81-14433
BAUER, E. N81-14548
BAXTER, V. D. N81-14282
BEALS, D. L. N81-14930
BEARD, S. C. N81-14013
BEBELAAR, F. N81-14194
BECH, H. P. N81-14235
BECHERT, D. W. N81-14791
BECKER, D. A. N81-14133
BECKER, F. J. N81-13993
BECKER, R. N81-14229
BECRAFT, W. R. N81-14885
BEETON, A. M. N81-14385
BEGGS, H. D. N81-14295
BEHN, R. N81-14299
BEHNKE, R. N81-14544
BEHREND, A. F., JR. N81-14163
BEMER, G. G. N81-14027
BENTHEM, J. P. N81-14351
BENTLEY, L. R. N81-14795
BEREMAND, D. G. N81-14397
BERGBREITER, D. E. N81-14085
BERGER, M. N81-14699
BERGERON, H. P. N81-13959
BERGSTRA, J. A. N81-14649
N81-14652
BERGSTROM, R. W. N81-14504
BERNING, P. T. N81-14666
BERNSTEIN, H. L. N81-14061
BERNSTEIN, W. N81-14952
BERRY, B. F. N81-14792
BERRY, J. D. N81-13918
BERSTEIN, J. D. N81-14129
BERTRAM, K. N81-14515
BERTRAND, R. R. N81-14071
BHATTACHARYYA, D. K. N81-14306
BICKFORD, W. E. N81-14883
BIECKER, G. A. N81-14378
N81-14661
BIERTUEMPEL, E. N81-13960
BIGHEL, L. N81-14887
BILLINGS, S. A. N81-14776
N81-14779
BINGHAM, G. N81-14594
BIRBARA, P. N81-14624
BIRCH, J. R. N81-14024
BIRCH, M. J. N81-14837
BIRK, A. N81-14107
BIRKEMEIER, W. P. N81-14198
BITTKER, D. A. N81-14399
BLACK, D. C. N81-14938
BLAKE, J. B. N81-14939
BLANTER, B. N81-13961
BLAZOWSKI, W. S. N81-14042
BLICKWEDEL, T. W. N81-14930
BLINK, J. A. N81-14052
BLOCH, J. T. N81-14389
BLOCK, E. N81-14375
BLOCK, L. P. N81-14859
N81-14956
BLODGETT, M. L. N81-14581
BLOM, R. G. N81-14372
BLOMQUIST, C. A. N81-14328
BLOOMSTER, C. H. N81-14464
BLOTTNER, F. G. N81-14700
BODENHEIMER, P. N81-14938
BODILLY, S. J. N81-14390
BOEHM, H. N81-14404
BOENIG, F. H. N81-14327
BOERS, J. E. N81-14823
BOHN, J. G. N81-14470
BOHNING, O. D. N81-13993
BOLAND, D. F., JR. N81-14554
BOLOTSKY, G. R. N81-14644
BOLTON, P. N. N81-14137
BOMAR, B. W. N81-14166
BOND, A. C. N81-14138
BONNER, R. S. N81-14565
BOONE, J. L. N81-14445
BORCHERS, R. R. N81-14892
BORENIUS, G. N81-14749
N81-14750
BORNSTEIN, R. D. N81-14531
BOSTON, C. R. N81-14512
BOTKIN, D. B. N81-14503
BOUCHER, R. N81-14172
BOUWS, E. N81-14602
BOYD, W. A. N81-14056
BOYER, A. M. N81-14135
BOYER, D. G. N81-14927
BRACKBILL, J. U. N81-14701
BRAND, J. D. N81-14038
BRAUNSTEIN, R. N81-14088
BRAVY, S. N81-14667
BRAY, R. E. N81-14546
BRAYTON, D. B. N81-14166
BREGLIA, D. R. N81-14923
BRENNING, N. N81-14942
BRIAN, T. J. S. N81-14270
BRIGGS, T. A. N81-14432
BRILL, J. P. N81-14295
BROCK, J. C. N81-14033
BROCKEN, H. J. B. M. N81-14868

BRODIE, I. N81-14431
BRODZIK, M. N81-14416
BROEMS, M. N81-14192
BROOKES, C. N81-14171
BROOME, B. D. N81-14377
BROSNAN, D. A. N81-14433
BROUCHOUS, D. A. N81-14879
BROWER, K. L. N81-14807
BROWN, D. P. N81-14575
BROWN, J. E., JR. N81-14478
BROWN, L. J. N81-14466
BROWN, P. A. N81-14613
BROWN, P. T. N81-14181
BROWN, R. W. N81-14018
BRUN, M. N81-14174
BRUNNER, H. N81-14743
N81-14744
BRUNSTETTER, F. H. N81-14620
BRYAN, M. L. N81-14372
BUCKLEY, D. H. N81-14079
BUDD, L. D. N81-13938
BUELL, R. H. N81-14618
BULL, J. O. N81-13940
BULZAN, D. L. N81-14396
BURCH, J. L. N81-14955
BURCHETT, O. L. N81-14112
BURES, M. N81-14866
N81-14867
BURLAND, J. B. N81-14181
BURNS, A. R. N81-14033
BURNS, W. A. N81-14179
BURRELL, K. E. N81-14882
BURROWS, J. R. N81-14950
BURSTEN, M. S. N81-14085
BUSH, C. E. N81-14882
BUSH, L. R. N81-14489

C

CADOFF, L. H. N81-14875
CAHN, J. W. N81-14904
N81-14904
CALLEN, J. D. N81-14890
CAMP, D. W. N81-14555
N81-14556
CAMPBELL, F. J. N81-14080
CAMPO, E. N81-14005
CANN, C. E. N81-14615
CANNISTRARO, S. N81-14850
CARACENA, F. N81-14571
CARIGNAN, G. R. N81-14947
CARLQUIST, P. N81-14861
CARLQVIST, P. N81-14858
CARR, C. H. N81-14930
CARR, M. P. N81-14708
CARR, S. H. N81-14248
CARRE, D. J. N81-14159
CARRIGAN, B. N81-14677
N81-14689
CARROLL, D. P. N81-14447
CARROLL, J. J. N81-14251
CARTER, J. E. N81-14702
CARTWRIGHT, W. D. N81-14600
CASAPIS, M. C. N81-14474
CAULET, B. N81-14787
CAVAGNARO, D. M. N81-14057
N81-14096
N81-14097
N81-14098
N81-14136
N81-14311
N81-14312
N81-14526
CAVENY, L. H. N81-14107
CAZIER, F. W., JR. N81-13922
CHADDA, M. M. N81-14236
CHAMPION, R. L. N81-14411
CHANDLER, G. D. N81-14163
CHANG, J. H. N81-13955
CHAPMAN, J. N. N81-14433
CHAPPAS, W. J. N81-14090
CHAPPELL, C. R. N81-14530
N81-14955
CHAVE, A. N81-14551
CHEN, J. M. N81-14870
CHEN, W. N81-14870
CHEN, W. Y. N81-14255
CHERNOFF, R. C. N81-14185
CHESTA, L. N81-13974
CHEUNG, J. T. N81-14899
CHICKLIS, E. P. N81-14307
CHILDS, J. M. N81-14625
CHINNERY, M. A. N81-14924
CHISHOLM, M. H. N81-13997
CHU, H. W. N81-14934
CHU, J. N81-13923
CHU, K. R. N81-14246
N81-14250
N81-14882
CHU, T. L. N81-14438
N81-14446
CHU, Y. C. N81-14263
CHUANG, B. N81-14524
CLAUSING, R. E. N81-14882
CLAYSMITH, C. R. N81-14153
CLIFTON, K. S. N81-14946
COBBLE, J. A. N81-14887
COBERLY, W. A. N81-14295
COCHARD, D. D. N81-14934
COLEMAN, J. O. N81-14206
COLEMAN, R. G. N81-13920
COLEMAN, R. M. N81-14703
COLLICA, J. C. N81-14644
COLONY, J. A. N81-14160
COMBER, M. G. N81-14253
COMEFORD, J. J. N81-14133
CONKLE, J. P. N81-13966
CONLEY, M. P. N81-14797
CONNOLLY, J. W. N81-14558
COOK, G. N81-14203
COOK, J. P. N81-14182
COON, C. W. N81-13953
COOPER, J. A. N81-14433
COOPER, P. A. N81-14346
COPLIN, J. F. N81-13964
CORBIN, J. C., JR. N81-14566
CORNMAN, W. R. N81-14827
CORSAN, J. M. N81-14170
CORTI, M. N81-14269
COSEL, R. M. N81-13939
COULTER, L. L., JR. N81-14199
COUNSELL, J. F. N81-14020
COUSTEIX, J. N81-13930
N81-14268
COWEN, D. S. N81-14931
COWLEY, J. M. N81-14903
COX, M. G. N81-14655
CRAIN, W. K. N81-13987
CRAMER, J. G. G. N81-14840
CRAVEN, J. D. N81-14956
CRAWFORD, L. W. N81-14433
CROSIER, W. N81-14614
CROSLEY, D. R. N81-14303
N81-14304
CROWELL, M. H. N81-13954
CROWLEY, J. L. N81-14419
CRUME, C. E. N81-14882
CRUTCHER, J. L. N81-14444
CULBERTSON, B. R. N81-14010
CUMMINGS, K. N81-14339
CURINGA, A. V. N81-14460
CURTIS, A. R. N81-14741
CURTIS, B. N81-14669
CZAPARY, L. S. N81-14280

D

DAHLMAN, O. N81-14535
DAHLQUIST, G. N81-14783
DAILY, M. I. N81-14372
DALE, L. N81-14125
DALGLEISH, W. H. N81-14105
DALLAVALLE, F. N81-14406
DALLMANN, U. N81-14272
DALY, C. J. N81-14930
DAMSKY, B. L. N81-14251
DANGELO, N. N81-14956
DANGELO, S. N81-14479
DANIELS, E. J. N81-14931
DANIELSEN, E. F. N81-14756
DARKAZALLI, G. N81-14437
DARNELL, A. N81-14052
DAS, M. B. N81-14482
DATTA, P. K. N81-14353
DAUGHTERY, D. C. N81-13977
DAUZVARDIS, P. N81-14515
DAVENPORT, A. J. N81-14026
DAVID-MALIG, M. A. N81-14319
DAVIDSON, C. A. N81-14506
DAVIDSON, D. L. N81-14067
DAVIS, C. R. N81-14291
DAVITIAN, H. N81-14469
DAY, D. L. N81-14327
DEAN, D. J. N81-14241
DECLERCQ, J. G. N81-14256
DEFERRARI, G. N81-13974
DEFRANCESCO, F. N81-14029
DEGNAN, J. R. N81-14328
DEITCH, A. N81-14150
DELLENEY, R. D. N81-14519
N81-14520
DELLIN, T. A. N81-14414
DEMATTIO, J. R. N81-13949
DEMPSTER, M. A. H. N81-14781
DENARD, C. N81-14406
DENESDI, L. N81-14474
DERAS, D. A. N81-14619
DERECHO, A. T. N81-14175
N81-14176
N81-14177
DEY, S. K. N81-14704
DICKSON, L. J. N81-14705
DIDION, D. N81-14913
DIEHL, R. N81-14022
DIEKMANN, O. N81-14739
N81-14740
N81-14762
DIERKE, R. N81-13960
DIETRICH, D. A. N81-14038
DIETRICK, D. L. N81-14875
DIETZ, M. S. N81-14274
DILLENCOURT, K. A. N81-14642
DILMORE, J. A. N81-14875
DIRK, C. W. N81-14900
DISEREGOALIGHIERI, S. N81-14937
DISTELBRINK, J. H. J. N81-14290
DIXON, T. H. N81-14372
DIZILLO-BENOIT, P. M. N81-14760
DOEKER, H. N81-14059
DOETSCH, K. H. N81-14147
DONAHUE, T. M. N81-14947
DONGARRA, J. J. N81-14761
DORENDORF, H. N81-14224
DOUMA, T. N81-14351
DOWD, P. J. N81-14620
DOWDY, T. E. N81-14433
DOWGIALLO, E. N81-14427
DOYLE, J. R. N81-14504
DREHER, P. E. N81-13979
DRESSELHAUS, G. N81-14009
DRESSELHAUS, M. S. N81-14009
DULIKRAVICH, O. N81-14706
DUNCAN, L. M. N81-14544
DUNLAP, J. L. N81-14882
DUPUY, N. N81-14803
DURIAU, J. N81-14174
DUTTON, J. A. N81-14593

E

EAGAN, G. D. N81-14621
EATHER, R. H. N81-14946
ECKELS, P. W. N81-14256
EDELMAN, R. B. N81-14042
N81-14134
EDIGHOFFER, H. H. N81-14345
EDMAN, D. A. N81-14580
EDWARDS, D. E. N81-14702
EDWARDS, G. R. N81-14344
EDWARDS, L. O. N81-14519
N81-14520
EDWARDS, M. G. N81-14708
EHERNBERGER, L. J. N81-14562
EHLERS, H. N81-14154
EHLERS, R. N81-13960
EHRLICH, A. C. N81-14065
EICHLER, B. N81-14225
EISEMAN, P. R. N81-14693
EISENREICH, S. J. N81-14385
EKLUNDH, J. O. N81-14656
EL-SAYED, M. A. N81-14033
ELACHI, C. N81-14372
ELBER, W. N81-14000
N81-14002
ELCHLEPP, R. N81-14407
ELDRIDGE, O. C. N81-14888
ELEVANT, T. N81-14862

ELLER, A. I. N81-14581
ELLIOTT, J. L. N81-14321
ELLIS, H., JR. N81-14187
ELLIS, R. E. N81-14051
ELROD, P. D. N81-14166
ELSNER, J. A. N81-14460
EMMERT, G. A. N81-14881
EMMLING, P. J. N81-14385
EMSLIE, A. G. N81-14943
ENDERS, J. N81-14557
ENDERS, N. N81-14239
ENGBERG, K. N81-13978
ENGLESSON, G. A. N81-14474
EPPLER, R. N81-13921
ERDMANN, F. N81-13960
ERICKSON, J. C., JR. N81-13977
ERIKSSON, L. E. N81-14707
ERNST, M. N81-14071
ETZWEILER, J. F. N81-14879
EVANGELOS, S. P. N81-14135
EVANS, D. G. N81-14397

F

FADER, W. J. N81-14876
FAGOT, H. N81-14300
FAHR, H. J. N81-14942
FAITH, R. N81-14517
FAKHOURI, S. Y. N81-14776
FALLIEROS, S. N81-14825
FALTHAMMAR, C. G. N81-14955
N81-14956
FANSLER, T. D. N81-14303
FARASSAT, F. N81-14790
FARRIS, P. F. N81-14432
FARTHING, W. H. N81-14955
FASSBENDER, L. L. N81-14464
FAZEKAS, P. N81-14802
FEDERGRUEN, A. N81-14780
FEDERMANN, E. F. N81-14416
FEHRENKAMP, L. G. N81-14077
FEINS, I. R. N81-14430
N81-14463
FELDMAN, D. N81-14912
FENG, T. N81-14420
FENNER, R. G. N81-14152
FERNANDO, C. E. N81-14919
FERRISS, D. H. N81-14025
FETT, R. W. N81-13989
FIELD, J. N81-14461
FIELDS, S. A. N81-14955
FIGUEROA, M. N81-13939
FILIPPENKO, I. N81-14786
FINDLEY, M. E. N81-14128
FINE, D. A. N81-14084
FINNERTY, W. R. N81-14425
FISHER, J. W. N81-14336
FISHER, M. L. N81-14781
FLANIGAN, V. J. N81-14128
FLEISCHMANN, R. N81-14404
FLEURY, C. N81-14347
FOLEY, J. T. N81-14506
FOLTING, K. N81-13997
FOLWEILER, R. C. N81-14307
FONASH, S. J. N81-14441
FONTAINE, A. B. N81-14198
FONTANA, C. E. N81-14597
FORD, J. P. N81-14372
FORSEY, C. R. N81-14708
FOUGHNER, J. T., JR. N81-13922
FOX, W. E. N81-14596
FRADKIN, L. N81-14515
FRAHM, J. P. N81-14143
FRANCE, D. H. N81-14134
FRANK, L. A. N81-14956
FRANSEN, A. N81-14749
N81-14750
FRANTTI, E. W. N81-14875
FRAZIER, J. W. N81-14433
FREDERICKS, R. W. N81-14953
FRELLER, H. N81-14234
FRIED, H. M. N81-14912
FRIEDMAN, H. W. N81-14872
FRIEDMAN, N. R. N81-14467
FRIGO, A. A. N81-14328
FROST, R. H. N81-14344
FROST, W. N81-14555
N81-14556
FU, C. Y. N81-14819
FU, L. S. N81-14337
FUCHS, H. J. N81-14236
FUELLMANN, M. N81-14238
FUGITTI, H. A. N81-14930
FUHRMANN, P. A. N81-14682
FUJITA, J. N81-14295
FULKS, G. J. N81-14539
FULLAM, H. T. N81-14072
FULLER, E. R., JR. N81-14095
FULLER, H. C. N81-14792

G

GABRIEL, K. R. N81-14659
GAITLEY, B. J. N81-14196
GALE, E. H. N81-14161
GALLAGHER, M. K. N81-13957
N81-14219
GALLUSCIO, E. H. N81-14619
GANN, A. G. N81-14924
GARDINER, D. A. N81-14760
GARIFO, L. N81-14301
GARRETT-PRICE, B. A. N81-14464
GARRETT, B. C. N81-14060
GARRETT, W. D. N81-14376
GARSTAND, M. N81-14434
GARTLING, D. K. N81-14277
GARVIN, D. N81-14913
GATLAND, I. R. N81-14034
GAUDETTE, E. P. N81-14324
GEAR, C. W. N81-14759
GEBIZLIOGLU, O. N81-14773
GENANT, H. K. N81-14615
GENOVA, M. N81-14406
GEORGE, T. F. N81-14805
GERHARZ, J. J. N81-14003
GERLACH, A. A. N81-14636
GERLACH, T. M. N81-14471
GERRELS, E. E. N81-14460
GHIA, K. N. N81-14709
GHIA, U. N81-14709
GHOSH, A. N81-14108
GHOSH, A. K. N81-14420
GIESKE, J. H. N81-14355
N81-14356
GIESLER, H. P. N81-14233
GIGLIO, M. N81-14083
GILBERS, G. N81-14401
GILCHRIST, L. P. N81-14553
GILL, P. N81-14308
GILLESPIE, T. J. N81-14800
GILLFILLAN, W. E. N81-13916
GINS, J. D. N81-14550
GIRVIN, D. C. N81-14055
GISDAKIS, S. N81-14239
GLAWISCHNIG, H. N81-14224
GLEESON, A. M. N81-14812
GOEDEL, H. N81-13973
GOETERS, K. M. N81-14622
GOETTLE, R. J., IV N81-14469
GOFF, R. C. N81-14563
GOLBECK, J. N81-14607
GOLDFARB, D. N81-14662
GOLDING, B. W. N81-14602
GOLDMAN, J. C. N81-14608
GOLDMAN, L. N81-14381
GOLDMAN, L. H. N81-13916
GOLZY, J. N81-14885
GOMEZ, M. P. N81-14357
GOODENOUGH, J. B. N81-14660
GOODING, R. H. N81-13981
GORHAM, E. N81-14510
GOULIANOS, K. N81-14808
GRANATSTEIN, V. L. N81-14246
GRASMAN, J. N81-14683
N81-14684
GRASSER, L. N81-14224
GRAVES, R. A., JR. N81-14710
GRAY, H. L. N81-14785
GRAY, N. C. N81-14137
GRAY, W. G. N81-14604
GREEN, M. A. N81-14179
GREENE, D. E. N81-14687
GREENE, G. C. N81-14790
GRESKOVICH, C. D. N81-14008
GRETSCHER, I. N81-14918
GRIER, R. S. N81-14621
GRIFFIN, C. R. N81-14288
GRILLO, D. N81-14193
GRIMAUD, J. E. N81-14168
GRINBERG, I. M. N81-14167
GRISONI, L. N81-14301
GRISSOM, D. S. N81-14142
GROENEBOOM, P. N81-14764
GRONCKI, P. J. N81-14469
GROOM, N. J. N81-13992
GROPP, W. N81-14699
GROSCHE, F. R. N81-14791
GROSS, G. E. N81-14483
GROSS, M. N81-14454
GRUNE, D. N81-14629
GRUNWALD, A. J. N81-13958
GUILLORY, W. A. N81-14049
GULBRANSEN, E. A. N81-14070
GULCAT, U. N81-14727
GULDEN, W. N81-14182
GUNST, R. F. N81-14770
GURALNIK, G. S. N81-14912
GURNETT, D. A. N81-14956
GUSDORF, J. N81-14434

H

HABERCOM, G. E., JR. N81-14285
N81-14286
N81-14297
N81-14309
N81-14310
N81-14525
HAERTIG, J. N81-14787
HAGENLOCH, I. N81-14228
HAITKO, D. A. N81-13997
HALDEMAN, C. W. N81-13986
HALE, G. M. N81-14050
HALE, J. K. N81-14686
N81-14753
HALES, J. L. N81-14264
HALL, D. G. N81-14280
HALL, D. W. N81-14711
HALLIKAINEN, M. N81-14374
N81-14578
HALLINAN, T. J. N81-14952
HALVERSON, D. R. N81-14771
HAMASAKI, S. N81-14874
HAMBY, C. W. N81-13949
HAMMARLING, S. J. N81-14655
HAMMERSCHMITT, J. N81-14224
HAMMONS, G. A. N81-14595
HAMPSON, R. F. N81-14541
HANDLEY, J. C. N81-14108
HANGER, R. T. N81-14389
HANSON, W. B. N81-14955
HARDESTY, W. N81-14339
HARDIE, R. W. N81-14341
HARMENING, W. A. N81-14199
HARRIES, J. E. N81-14505
HARRINGTON, A. N. N81-14712
HARRIS, D. L. N81-14521
HARRIS, E. D. N81-14915
HARSHA, P. T. N81-14134
HART, E. W. N81-14358
N81-14362
HART, J. D. N81-14785
HARTEN, A. N81-14908
HASSELROT, A. N81-13925
HATAYAMA, A. N81-14849
HATFIELD, J. J. N81-13958
HAUCK, H. N81-13980
HAUG, G. N81-14231
HAUSAMMANN, H. N81-14336
HAYNIE, A. T. N81-13959
HAYS, P. B. N81-14947
HEALY, H. C. N81-14432
HEBERT, P. J. N81-14598
HECKMAN, R. V. N81-14014
HEELIS, R. A. N81-14955
HEERING, J. N81-14631
HEFFERMAN, J. T. N81-14077
HEFFLER, J. N81-14404
HEIDEMANN, U. N81-14348
HEIJBOER, L. C. N81-14577
HEIKKILA, W. J. N81-14955
HEIMKE, G. N81-14402
HEINZLE, M. N81-14239
HELLBLOM, G. N81-14862
HELLSTEN, T. N81-14855
HEMKER, P. W. N81-14732
HENDERSON, R. W. N81-14498

HENRIKSSON, J. N81-14191
HENRY, R. A. N81-14084
HERBERT, H. E. N81-14646
HERCHENROEDER, R. B. N81-14073
HERMANN, R. N81-14235
HERRMAN, H. N81-14927
HERRO, M. N81-14215
HERTZ, W. N81-14854
HEUER, A. H. N81-14091
HEWSON, E. W. N81-14590
HEYBACH, J. P. N81-14606
HICKOK, R. L. N81-14822
HICKS, C. P. N81-14020
HIDAHL, J. W. N81-14165
HIKODAM, Z. D. N81-14423
HILHORST, D. N81-14739
HILL, F. N81-14381
HILL, F. K. N81-14498
HILSENROD, A. N81-14570
HINES, J. N81-14594
HINKLE, B. N81-14467
HIPSKIND, R. S. N81-14756
HIRAO, A. N81-14843
HIRSCH, K. N81-14298
HIRT, C. W. N81-14281
HITCHCOCK, D. A. N81-14880
HITNEY, H. V. N81-14205
HOENLINGER, H. N81-13972
N81-13973
HOFFMAN, J. H. N81-14530
HOFFMAN, N. J. N81-14052
HOFMANN, W. N81-13942
HOGG, R. D. N81-13978
HOLLINGER, J. P. N81-14383
HOLMAN, H. Y. N81-14504
HOLMOVIST, B. N81-14862
HOLTSLAG, A. A. M. N81-14189
HOLTZ, T. N81-14169
HOLZGRAF, J. F. N81-14094
HORNER, M. W. N81-14332
HOTCHKISS, R. S. N81-14281
HOULBERG, W. A. N81-14885
HOULE, E. H. N81-14123
HOUSKA, K. H. N81-14231
HOUSNER, J. M. N81-14345
HOWELL, H. R. N81-14163
HSI, S. N81-14124
HSIEH, E. J. N81-14074
HSU, Y. H. N81-14255
HUANG, M. N81-14714
HUDSON, E. A. N81-14469
HUDSON, J. E. N81-14251
HUFFMAN, J. N81-13997
HULBERT, L. E. N81-14167
HUNDEMANN, A. S. N81-14493
N81-14494
N81-14495
N81-14496
N81-14497
HUNGERFORD, E. V., III N81-14814
HUNKA, J. N81-13978
HUNTER, J. A. N81-14146
HUSINSKY, W. R. N81-14048
HUSSEY, C. C. N81-14460
HWANG, H. S. N81-14430
N81-14463
HYDE, J. C. N81-14452
HYLEN, J. N81-14509

I

IBRAHIM, E. N81-14256
ICHIKAWA, Y. H. N81-14846
IMAM, I. N81-14251
INDOVINA, P. L. N81-14850
IQBAL, M. N81-14175
N81-14176
IRWIN, G. R. N81-14336
ISLER, R. C. N81-14882
ISRAELSON, H. N81-14535
ISSER, S. N81-14467
ITIKAWA, Y. N81-14847
IWAI, T. N81-14847

J

JAAX, J. R. N81-14143
N81-14144
JACHIMOWSKI, C. J. N81-14017
JACOBS, D. N81-14875
JACOBS, S. N81-14154
JACOBS, V. L. N81-14036
JAKKULA, P. N81-14578
JAMES, H. G. N81-14954
JANK, T. N81-14195
JANKOWSKY, W. S. N81-14534
JANOCKO, M. A. N81-14256
JANSEN, L. N81-14781
JANZEN, G. N81-14853
JARRELL, J. D. N81-14579
JASPERSON, W. H. N81-14543
JAWAHERY, A. N81-14509
JEANLOZ, R. N81-14366
JENKINS, R. G. N81-14115
JENNEY, G. D. N81-13976
N81-14326
JENSEN, P. A. N81-14934
JEVICKI, A. N81-14912
JIMISON, W. L. N81-14514
JOHANNES, J. D. N81-14086
JOHN, A. J. N81-14792
JOHNSON, C. D. N81-14504
JOHNSON, C. T. N81-14871
JOHNSON, D. R. N81-14580
JOHNSON, F. C. N81-13962
JOHNSON, G. B. N81-14253
JOHNSON, I. N81-14056
JOHNSON, J. E., JR. N81-14605
JOHNSON, J. W. N81-14004
JOHNSON, M. R. N81-14641
JOHNSON, R. G. N81-14950
JONATH, A. D. N81-14419
JONES, E. M. N81-14940
JONES, J. E. N81-14260
N81-14645
N81-14679
JONES, J. I. N81-14288
JONES, W. R. N81-14004
JONG, R. A. N81-14876
JOOS, H. D. N81-13943
JOSHI, S. M. N81-13992
JUERGENS, W. N81-14231
JULY, M. J. N81-14552
JUNGA, F. A. N81-14419
JURCZYK, D. N81-14534

K

KAHM, F. N81-14835
KALGHATGI, G. T. N81-14028
KALINA, D. W. N81-14037
KALLENBERG, P. J. M. N81-14763
KAMIMURA, T. N81-14845
KANEKO, Y. N81-14847
KANG, K. N81-14912
KANNEWURF, C. R. N81-14037
KAR, R. J. N81-14069
KARADI, G. M. N81-14439
KATO, T. N81-14847
KATZ, R. N. N81-13967
KAUFMAN, A. N81-14390
KAUSCHE, H. N81-14227
KEARNES, J. H. N81-14157
KEAST, D. N. N81-14799
KEER, S. J. N81-14139
KELLER, B. D. N81-13961
KELLER, D. N81-14929
KELLER, J. L. N81-14573
KELLNER, W. N81-14239
KELLOGG, P. J. N81-14952
KELLY, J. N81-14927
KELLY, J. R. N81-14660
KELSO, R. M. N81-14155
KEMPTON, A. J. N81-14794
KENNEDY, T. L. N81-13931
KENNEL, H. F. N81-13991
KESTIN, J. N81-14278
KIDNAY, A. J. N81-14119
KIENAPPEL, K. N81-13927
N81-13929
KILIAN, H. J. N81-14035
KILLEEN, J. N81-14891
KING, A. G. N81-14105
KING, J. N81-14661
KING, L. L. N81-14178
KING, W. F. N81-14791
KINMAN, D. N81-14244
KINZLER, J. A. N81-14077
KIRSCH, L. E. N81-14813
KIRWAN, A. D. N81-14921
KITCHENS, P. F. N81-14560
KLEEMAN, P. N81-14469
KLEIN, H. H. N81-14874
KLEIN, I. S. N81-14930
KLEIN, W. H. N81-14574
KLEINER, G. N. N81-14624
KLINT, P. N81-14630
N81-14651
KNAPP, H. N81-14229
KNAUSS, K. N81-14471
KNIEPKAMP, H. N81-14239
KNUTH, D. N81-14235
KOCHKA, E. L. N81-14875
KOCKARTS, G. N81-14528
KOEPP, F. N81-14576
KOESTER, K. N81-14614
KOITKA, H. N81-14534
KOLEN, A. N81-14778
KOMEN, G. J. N81-14602
KONNO, K. N81-14846
KOOI, C. F. N81-14419
KOORNWINDER, T. H. N81-14738
KOSHI, Y. N81-14849
KOSTERS, M. T. N81-14736
KOSTKA, A. N81-14897
KOUTZ, S. L. N81-14833
KOWALSKI, E. J. N81-14713
KRAFT, D. N81-14680
N81-14681
KRALL, N. A. N81-14874
KRAUS, K. N81-14909
KRAUS, W. N81-13950
N81-14802
KRAUSE, P. C. N81-14447
KRAUSZ, A. N81-14140
KREBS, J. J. N81-14293
KREIS, R. G., JR. N81-14610
KREISSELMEIER, G. N81-13970
KREISSELMEIR, G. N81-14680
KRUEGER, H. H. N81-14835
KRUESI, E. N81-14669
KRUPKA, M. C. N81-14451
KUEHN, M. N81-13973
KUHN, J. K. N81-14422
KUISL, M. N81-14229
KUKIELKA, C. A. N81-14885
KULCINSKI, G. L. N81-14881
KULP, J. C. N81-14199
KUNZ, R. N81-13950
KUSZYK, J. A. N81-14875
KUTHY, A. N81-14865
N81-14867

L

LACKEY, W. W. N81-13966
LAEMMEL, F. N81-14229
LAGEWEG, B. J. N81-14780
N81-14781
LAIRD, C. N81-14363
LALLMAN, F. J. N81-14343
LAM, K. S. N81-14306
N81-14805
LANDSTROM, D. K. N81-14492
LANE, R. O. N81-14811
LAPWORTH, K. C. N81-14026
LARABEE, R. D. N81-14261
LARKO, D. N81-14593
LARSON, D. E. N81-14013
LASKEY, J. M. N81-14243
LASSEN, K. N81-14536
LAU, S. K. N81-14875
LAU, Y. Y. N81-14246
LAUB, R. J. N81-14114
LAVE, L. B. N81-14511
LAWLER, F. N81-14381
LAWRENCE, W. E. N81-14760
LAX, P. D. N81-14908
LEE, D. W. N81-14513
LEE, J. T. N81-14564
LEE, K. D. N81-14714
N81-14715
LEE, N. H. N81-14474
LEE, S. H. D. N81-14056
LEE, T. N81-14554
LEE, W. S. N81-14077

LEE, X. S. N81-14817
LEGENDRE, P. J. N81-14169
LEHNERT, B. N81-14863
N81-14864
LEINBACH, H. N81-14952
LEMPERT, J. N81-14875
LENSTRA, J. K. N81-14728
N81-14781
LEONARD, B. R., JR. N81-14883
LEONARD, J. I. N81-14151
LEONTARITIS, I. J. N81-14779
LESLIE, T. C. N81-14837
LESSER, H. K. N81-14038
LESTER, P. A. N81-14441
LEVIN, S. F. N81-14825
LEVY, G. W. N81-14461
LEVY, P. F. N81-14121
N81-14135
LEWIS, F. P. N81-14585
LI, C. T. N81-14825
LI, C. Y. N81-14358
LICARI, J. J. N81-14087
LIEPINS, G. E. N81-14925
LIMAYE, D. R. N81-14467
LINDBERG, L. N81-14860
LINDELL, I. V. N81-14223
LINDEMUTH, T. E. N81-14123
LINDNER, F. N81-13994
LINDQUIST, R. N81-14192
LINDQVIST, P. A. N81-14859
LINDSEY, C. N81-14434
LINSON, L. M. N81-14952
LITTLE, P. F. N81-14836
LITTLE, R. P. N81-13979
LOEHR, H. N81-13960
LOEW, M. H. N81-14381
LOMBARD, C. K. N81-14716
LOMBARD, M. P. N81-14716
LOMUTO, N. N81-14660
LOTZE, A. N81-13974
LOUGHNANE, M. D. N81-14071
LOUIS, G. A. N81-14432
LUBELL, M. S. N81-14816
LUCARELLI, R. N81-14240
LUCAS, E. J. N81-13932
LUCE, R. G. N81-14167
LUDWIG, D. N81-14408
LUE, J. W. N81-14254
LUKACHINSKI, J. N81-14469
LUND, G. F. N81-14612
LUNDRY, J. L. N81-13920
LUSIGNAN, B. B. N81-14211
N81-14212
N81-14213
LUSKUS, L. J. N81-14035
LUTES, G. F., JR. N81-14186
LYDING, J. W. N81-14037
LYNCH, D. R. N81-14604
LYNCH, T. J. N81-14085
LYSENKO, W. P. N81-14831

M

MAAG, W. L. N81-14465
MACGLASHAN, W. F. N81-14318
MACHETTO, F. N81-14937
MACKELPRANG, C. E. N81-14252
MACLEOD, R. I. N81-14575
MACMILLAN, H. F. N81-14419
MADER, L. N81-14023
MAEDA, H. N81-14889
MAEDER, P. F. N81-14278
MAES, R. N81-14459
MAGAARD, L. N81-14603
MAGER, A. N81-13996
MAGNUSON, C. F. N81-14506
MAHAJAN, S. M. N81-14880
MAHONY, C. N81-14836
MAISCH, W. G. N81-14293
MALMSKOG, S. N81-14862
MALVEZZI, A. M. N81-14301
MANDEVILLE, M. N81-14459
MANDL, R. N81-14660
MANHARDT, P. D. N81-14698
MANNA, Z. N81-14665
MANTEUFFEL, T. A. N81-14757
N81-14758
MARCUS, A. A. N81-14929
MARCUS, M. N81-14786
MARGOLIS, J. S. N81-14015
MARGOLLASH, D. J. N81-14821
MARICLE, D. L. N81-14432
MARK, J. W. K. N81-14869
MARKLUND, G. N81-14859
MARKS, T. J. N81-14037
N81-14900
MARSHFIELD, M. J. N81-14838
MARTIN, A. N81-14791
MARTIN, C. L. N81-13966
MARTIN, J. K. N81-14462
MARTIN, R. M. N81-14790
MARTINELLI, G. N81-14240
MARTINELLI, M. N81-14269
MARUSKA, H. P. N81-14420
MARUYAMA, T. N81-14509
MASAMURA, R. A. N81-14065
MASON, J. B. N81-14837
MASSARO, M. N81-14141
MASTIN, C. W. N81-14692
MATHER, R. L. N81-14199
MATSUZAWA, M. N81-14847
MATULEVICIUS, E. S. N81-14071
MAUK, S. C. N81-13946
N81-14313
N81-14314
N81-14315
N81-14316
MAURO, C. A. N81-14668
MAUTZ, J. A. N81-14362
MAY, S. C. N81-14123
MAYER, C. R. N81-13961
MAYER, G. J. N81-14247
MAYES, B. W., II N81-14814
MAYNARD, C. W. N81-14881
MAYO, W. T., JR. N81-14302
MCALLISTER, W. J. N81-14416
MCBRIDE, J. B. N81-14874
MCCARTHY, A. L. N81-14852
MCCARTHY, J. N81-14572
MCCARTHY, M. F. N81-14011
MCCLAIN, D. W. N81-14454
MCCLLOUGH, J. R. N81-14147
MCCLURE, M. S. N81-14037
MCCOLL, J. G. N81-14523
MCCORMICK, N. J. N81-14883
MCCRARY, L. E. N81-14145
MCDANIEL, E. W. N81-14034
MCDEDE, J. B. N81-13959
MCDIARMID, I. B. N81-14950
MCDONALD, R. N. N81-14031
MCGINNISS, V. D. N81-14492
MCGRATH, R. T. N81-14883
MCGREGOR, R. D. N81-14542
MCGRORY, J. B. N81-14828
MCKENNA, K. F. N81-14884
MCKEOWN, D. N81-14153
MCLENNAN, D. D. N81-14798
MCMEEKING, R. M. N81-14357
MCMILLAN, J. D. N81-14601
MCNAB, T. K. N81-14419
MEDLOCK, L. E. N81-14105
MEERTENS, L. G. L. T. N81-14626
N81-14627
N81-14628
MEIER, B. W. N81-14453
MEIJERS, P. N81-14352
MELER, G. H. N81-14070
MELGARES, M. A. N81-14143
MENAKER, B. N81-14474
MENDE, S. B. N81-14946
MENDELSOHN, D. A. N81-14342
MENEES, G. P. N81-14716
MENTEL, J. N81-14854
MERRIGAN, M. N81-14279
MERSON, T. J. N81-14453
MERWIN, J. T. N81-13916
MESSNER, R. N81-14661
METCALFE, A. G. N81-14092
MEYER, R. E. N81-14545
MEYER, S. F. N81-14074
MEYER, W. L. N81-14789
MIDDLETON, D. N81-14216
MIDDLETON, J. A. N81-14146
MIDDLETON, W. D. N81-13920
MIENTEK, A. P. N81-14432
MILBURN, R. N81-14509
MILEY, S. J. N81-14647
MILHOAN, J. D. N81-14149
MILLAHN, K. O. N81-14534
MILLE, P. N81-14350
MILLER, E. R. N81-14154
MILLER, J. R. N81-14254
MILLIGAN, R. V. N81-14062
MILLION, D. L. N81-14670
MILLS, T. K. N81-14051
MILORA, S. L. N81-14882
MINECK, R. E. N81-13918
MINGMA, Z. N81-14509
MINKARAH, I. N81-14182
MINTZ, E. A. N81-14900
MISKELL, R. V. N81-14334
MITCHELL, D. H. N81-14131
MITCHELL, F. O. N81-14386
MITLEHNER, H. N81-14898
MIYOSHI, K. N81-14079
MOHN, J. H. N81-14325
MOIR, R. W. N81-14893
MOJARIA, M. N81-14364
MOLINELLI, E. J. N81-14921
N81-14922
MOLL, T. E. N81-13972
MOLTZ, D. M. N81-14047
MOLYNEAUX, M. S. N81-14121
MONGIA, H. C. N81-14267
MONSEN, P. N81-14197
MONTAN, D. N. N81-14911
MORELLI, A. N81-14301
MORENO, J. B. N81-14700
MORETTI, G. N81-14691
MORJARIA, M. N81-14359
N81-14360
MORRIS, F. A. N81-14929
MORRISON, G. F. N81-14405
MORRISON, J. E. N81-14883
MORRISON, L. W. N81-14294
MORTARIA, M. N81-14361
MORTON, M. N81-14784
MOSES, C. A. N81-13953
MOSES, J. N81-14755
MOTSCHMANN, H. N81-14854
MUDGE, L. K. N81-14131
MUELA, C. A. N81-14519
N81-14520
MUELLER, G. N81-14851
MUENSCHER, D. N81-13926
MUENZ, W. D. N81-14227
MUKHEMYETGALIEV, T. G. N81-14173
MUKHERJEE, S. N81-14358
N81-14359
N81-14360
N81-14361
N81-14364
MULCAY, W. N81-13923
MULLEN, C. R. N81-14157
MULLER, D. J. N81-14460
MUNCY, R. E. N81-14010
MURPHY, J. R. N81-14207
MURPHY, L. D. N81-13916
MURR, L. E. N81-14902
MYLES, K. M. N81-14056

N

NAGANO, S. N81-14220
NAGARAJARAO, C. R. N81-14590
NAGY, A. F. N81-14947
NAIRN, D. E. N81-14930
NAKAI, Y. N81-14847
NAMBOODRI, C. G. N81-14093
NAUMANN, W. N81-13978
NEAL, R. E. N81-14180
NEALE, J. B. N81-14468
NEARHOOF, S. N81-14416
NEIDIG, A. N81-14401
NEIGHBOURS, J. R. N81-14065
NEISE, W. N81-14796
NEITZEL, R. E. N81-13985
NEWTON, A. G. N81-13984
NEYNABER, R. H. N81-14806
NGOC, T. D. K. N81-14798
NICHOLS, B. D. N81-14281
NICHOLS, F. W. N81-14389
NIELSEN, N. B. N81-14514
NIGRO, D. N. N81-14329
NIKHIL, R. N81-14920
NILSSON, F. N81-14323
NNAJI, S. N81-14434
NOCEDAL, F. N81-14214

NOCHUMSON, D. N81-14550
NOERSETT, S. P. N81-14744
NOONKESTER, V. R. N81-14584
NOVIL, M. N81-14931
NOXON, J. P. N81-14947
NUSS, H. E. N81-14164
NUTKIS, M. S. N81-14071
NUTTALL, A. H. N81-14767

O

OBRIEN, T. J. N81-14455
OCHS, G. R. N81-14600
OCKERMAN, J. B. N81-14930
OESTENSSON, B. N81-14323
OETTINGER, F. F. N81-14261
OFFER, H. P. N81-14460
OGANOWSKI, G. N81-14460
OGASAWARA, M. N81-14843
N81-14849
OH, Y. H. N81-14717
OHRING, S. N81-14718
OIE, T. N81-14810
OKABAYASHI, M. N81-14889
OKEEFE, R. N81-14580
OKUNO, K. N81-14847
OLASKY, C. N81-14148
OLICH, E. N81-14460
OLIGER, J. N81-14699
OLSEN, G. C. N81-14001
OLSEN, W. N81-14559
OLSON, J. M. N81-14129
OMURTAG, Y. N81-14128
ONEAL, D. L. N81-14462
ONEGA, R. J. N81-14885
OOSTERHOFF, J. N81-14764
OPILLA, R. N81-14125
ORLANDI, G. N81-14240
OVERTON, D. E. N81-14380
OWENS, D. H. N81-14685
N81-14748

P

PACHONIK, H. N81-14231
PACKER, L. L. N81-14325
PADEN, D. S. N81-14378
PAILHAS, G. N81-13930
N81-14268
PALM, J. A. N81-14008
PALMBERG, B. N81-14354
PALMER, W. F. N81-14907
PANOFSKY, H. A. N81-14593
PAPADOPOULOS, K. N81-14952
PARK, K. C. N81-14345
PARK, S. M. N81-14455
PARKER, B. M. N81-14007
PARKER, E. R. N81-14069
PARKS, D. M. N81-14357
PARL, S. N81-14197
PARMIGIANI, F. N81-14269
PARR, F. N81-13956
PARR, W. C. N81-14769
PARRISH, R. P., JR. N81-14162
PARSONS, G. L. N81-14085
PARTAIN, L. D. N81-14487
PATMORE, J. W. N81-14470
PAUL, C. R. N81-14200
PAUWELUSSEN, J. P. N81-14617
PAVLENCO, G. F. N81-14474
PAZAK, R. S. N81-14663
PEDERSEN, C. R. N81-13982
PEDERSON, D. O. N81-14245
PEECK, H. H. N81-14602
PEINADO, C. O. N81-14833
PELKA, W. N81-14472
PELLA, P. A. N81-14053
PELTZER, R. D. N81-14284
PENG, Y. K. M. N81-14886
PENNINGS, N. H. N81-14156
PEPPER, D. W. N81-14592
PERLMAN, M. D. N81-14775
PERMERLANI, W. N81-14251
PERRY, J. C. N81-14221
PERRY, R. T. N81-14883
PERRYMAN, M. A. C. N81-14937
PETELSKI, E. F. N81-14942
PETERSEN, J. C. N81-14289
PETERSON, J. R. N81-14436
PETTIT, R. B. N81-14412
N81-14415
PHILLIPSON, J. H. N81-14106
PICKARD, A. C. N81-14349
PICKHOLTZ, R. L. N81-14381
PICKS, L. B. N81-14433
PIELKE, R. A. N81-14434
PITTMAN, P. F. N81-14416
PLAVNEY, D. N81-14619
POCOCK, C. L. N81-14561
POETZLBERGER, H. W. N81-14227
POHL, R. V. N81-14251
POLLAK, T. M. N81-14307
POLLARD, J. J. N81-14637
N81-14638
POMEROY, B. D. N81-14460
POMPER, M. N81-14239
PORTER, W. A. N81-14038
POTTER, J. L. N81-14378
POTTER, R. C. N81-14799
PRADHAN, D. K. N81-14635
PRAUSNITZ, J. M. N81-14120
PREMAT, G. N81-14156
PRESTON, J. L., JR. N81-14432
PRICE, E. W. N81-14108
PRICE, L. L. N81-14275
PRICE, V., JR. N81-14547
PRIMDAHL, I. S. N81-14537
PROPHET, W. W. N81-14625
PRYATEL, J. A. N81-14910
PSARRAS, T. N81-14016
PULS, J. N81-13984
PURCELL, J. R. N81-14255
PURSEL, R. N81-13945

Q

QUARRINGTON, C. M. N81-14941
QUASHIE, P. N81-14391
QUAST, A. N81-13952
QUAST, W. N81-14897
QUINBY, G. F. N81-13941
QUINN, R. K. N81-14413
N81-14901

R

RAADU, M. A. N81-14856
N81-14858
RABE, D. C. N81-14276
RADFORD, R. C. N81-13969
RADMER, R. N81-14607
RAEUCHLE, E. N81-14851
N81-14852
RAGOLIA, A. J. N81-14930
RAGSDALE, C. N81-14391
RAHA, S. N81-14812
RAI, M. M. N81-14719
RAJU, G. V. S. N81-14885
RAKHMATULLINA, R. G. N81-14173
RALL, B. N81-14229
RAMRUS, A. N81-13995
RANSON, W. A. N81-14547
RATZEL, A. C. N81-14410
RAUCH, H. W. N81-14082
RAUH, R. D. N81-14443
RAUHUT, J. N81-14231
RAY, G. K. N81-14182
REA, J. A. N81-14597
READ, M. E. N81-14250
READY, J. F. N81-14839
READY, P. J. N81-14196
REASONER, D. L. N81-14530
N81-14957
REDDELL, L. M. N81-14930
REDFIELD, D. N81-14440
N81-14442
REED, W. E. N81-13947
N81-13948
N81-14099
N81-14100
N81-14101
N81-14102
N81-14209
N81-14210
N81-14218
N81-14258
N81-14259
N81-14335
REED, W. H., III N81-13922
REESE, D. N81-14927
REICHEL, E. N81-14835
REID, J. N81-14270
REID, S. C. N81-14152
REIMHERR, G. W. N81-14262
REMBAUM, A. N81-14076
REUSCH, M. N81-14889
REUTER, R. C., JR. N81-14417
RHODES, H. E. N81-14824
RHODES, L. R. N81-14142
RICH, J. W. N81-14815
RICHARD, B. D. N81-14639
RICHARDS, W. E. N81-14500
RICHARDSON, A., III N81-13966
RICHMOND, R. G. N81-14155
RICHTER, F. M. N81-14366
RINNOOYKAN, A. H. G. N81-14728
N81-14781
RIPKEN, H. W. N81-14942
RISENG, C. N81-14459
RISTOW, D. N81-14239
RITCHIE, R. O. N81-14066
RITTELMANN, P. R. N81-14416
RITTER, J. E., JR. N81-14095
RIX, O. N81-13971
ROBERTS, P. T. N81-14028
ROBERTS, R. N81-14336
ROBERTS, W. T. N81-14944
ROBERTSON, J. B. N81-13958
ROBERTUS, R. J. N81-14131
ROBINSON, D. W. N81-14792
ROE, J. M. N81-14543
ROEHR, H. N81-14298
ROGER, B. L. N81-14340
ROGERS, J. D. N81-14256
N81-14473
ROGERS, M. L. N81-14051
ROGERS, W. F. N81-14142
ROM, F. E. N81-14465
ROME, J. A. N81-14890
RONCHIATO, G. N81-14005
ROONEY, D. M. N81-14284
ROSATI, A. N81-14850
ROSENFELD, A. N81-14688
ROSS, M. J. N81-14256
ROSSER, R. W. N81-14016
ROTH, E. P. N81-14412
N81-14415
ROUND, D. F. N81-13929
ROWELL, D. N81-14478
RUBBERT, P. E. N81-14714
RUBEY, W. A. N81-14054
RUDD, P. J. N81-14941
RUDMANN, A. A. N81-14320
RUFF, P. E. N81-14063
RUMMEL, J. A. N81-14151
RUNKLE, R. E. N81-13990
RYPACEK, R. N81-14236
RYUFUKU, H. N81-14847

S

SACHER, P. N81-13950
SADLER, J. W. N81-14875
SAKA, N. N81-14064
SAKAI, H. N81-14540
SALAMO, G. J. N81-14524
SALE, A. H. J. N81-14654
SALERNO, M. N81-14240
SALIARIS, C. N81-13926
SALIMBENI, G. N81-14406
SALTZMAN, J. N81-14701
SALWEN, H. N81-14266
SALZMANN, H. N81-14298
SAND, J. N81-14742
SANDERSON, J. E. N81-14121
SANDERSON, R. A. N81-14432
SANDIE, W. G. N81-14946
SANTHANAM, K. N81-14531
SARABER, M. J. M. N81-14602
SARANTITES, D. G. N81-14826
SARGENT, J. N81-14141
SATO, T. N81-14845
SATTERFIELD, C. N. N81-14124
SATTINGER, D. H. N81-14804
SAVA, P. G. N81-14292
SAWKO, P. M. N81-13999

SAWYER, J. W. N81-14346
SAWYER, R. E. N81-14519
N81-14520
SAXENA, S. C. N81-14044
SCHAFRANEK, D. N81-13975
SCHARFF-GOLDHABER, G. N81-13998
SCHATTER, E. N81-14230
SCHECHTER, S. N81-14694
SCHEFFEL, J. N81-14862
SCHEGGI, A. M. N81-14959
SCHERER, M. N81-14527
SCHICK, A. P. N81-14379
SCHIPPERS, H. N81-14732
SCHIRMER, O. F. N81-14022
SCHLOSSNAGLE, G. W. N81-14380
SCHLOTTER, P. N81-14022
SCHLUETER, K. N81-14229
SCHMEISER, B. W. N81-14774
SCHMIDT, H. N81-14231
SCHMIDT, Z. N81-14295
SCHMIT, L. A., JR. N81-14347
SCHMITT, H. N81-14058
SCHMRE, J. N81-14766
SCHNITZER, H. J. N81-14813
SCHNOELLER, M. N81-14898
SCHOCH, K. F., JR. N81-14900
SCHOEYER, H. F. R. N81-14104
N81-14194
SCHRAMM, D. N. N81-14939
SCHUCANY, W. R. N81-14769
SCHUELLER, P. G. N81-14851
SCHUESSLER, H. N81-14229
SCHUETZ, D. N81-14003
SCHULTE, S. C. N81-14883
SCHULTZ, H. N81-14578
SCHWAB, D. J. N81-14387
SCHWAB, J. N81-14787
SCHWARZENAU, R. N81-14235
SCOBLE, W. R. N81-14419
SCOTT, C. A. N81-14506
SCUDIERE, J. D. N81-14256
SEALOCK, L. J., JR. N81-14131
SEIBEL, B. L. N81-14166
SEIDL, L. H. N81-14183
SELIG, W. N81-14132
SELLERS, D. L. N81-14387
SELMAN, J. R. N81-14041
SENSBURG, O. N81-13972
N81-13973
N81-13974
SENSENY, R. M. N81-14137
SEPPI, A. N81-14029
SETHI, S. P. N81-14768
SETSER, D. W. N81-14031
SHAFER, J. B. N81-14111
SHAFROTH, S. M. N81-14818
SHARBAUGH, A. H. N81-14251
SHARP, R. D. N81-14950
SHARP, W. E. N81-14530
SHARPE, A. N81-14147
SHAW, B. J. N81-14068
SHAW, R. R. N81-14956
SHAWHAN, S. D. N81-14956
SHEARER, J. A. N81-14056
SHEEHAN, J. E. N81-14094
SHELDAHL, R. E. N81-14013
SHELLEY, E. G. N81-14950
SHELNUTT, J. B. N81-14625
SHEPHERD, D. E. N81-14760
SHEPHERD, G. G. N81-14949
SHEPPARD, S. B. N81-14669
SHERBORNE, W. D. N81-14149
SHESHADRI, T. S. N81-14108
SHESHINSKI, R. N81-14517
SHIMIZU, K. N81-14841
SHIMIZU, T. N81-14846
SHIPTON, M. S. N81-14616
SHIRER, H. N. N81-14593
SHIRK, N. K. N81-14139
SHORT, R. W. N81-14895
SHUMATE, M. S. N81-14015
SICHELSTIEL, W. N81-14236
SICZEK, A. A. N81-14056
SIEBERT, M. G. N81-14380
SIENKIEWICZ, M. E. N81-14553
SIGGIA, S. N81-14045
N81-14046
SIGMAN, R. K. N81-14108
SIKRA, J. C. N81-14169
SILBER, D. N81-14238
SILVERSTEIN, J. D. N81-14250
SIM, J. R. N81-14330
SIMMONS, G. M. N81-14454
SIMPSON, R. B. N81-14720
SIN, H. C. N81-14064
SINCLAIR, D. W. N81-14275
SINEATH, H. H. N81-14128
SINFELT, J. H. N81-14824
SINGH, S. K. N81-14256
SINGHAL, S. C. N81-14331
SINT, M. N81-14657
SIPPEL, K. O. N81-14006
SISSON, C. E. N81-14410
SKALL, M. W. N81-14644
SKEEL, R. D. N81-14754
SLICHTER, C. P. N81-14824
SLIWA, S. M. N81-13968
SMART, A. E. N81-14302
SMELTZER, C. E. N81-14092
SMIGIELSKI, P. N81-14292
N81-14300
N81-14787
SMITH, A. N81-14010
SMITH, B. W. N81-14940
SMITH, D. E. N81-14668
SMITH, J. N81-14582
SMITH, R. N81-13969
SMITH, R. E. N81-14693
SMITH, S. R. N81-14724
SMYK, E. B. N81-14056
SNEDDON, R. N81-14837
SNELL, J. N81-14913
SNOW, J. W. N81-14434
SNYDER, J. H. N81-14384
SOCKOL, P. M. N81-14721
SOFRONIJEVIC, D. N81-14233
SOLBERG, W. D. N81-14251
SOLIE, C. H. N81-14152
SOLOMON, A. D. N81-14760
SOMERS, D. M. N81-13921
SOMMEIJER, B. P. N81-14731
SOMREK, R. L. N81-14599
SOO-HOO, R. N81-14123
SORENSON, R. L. N81-14722
N81-14723
SOUTHERN, I. S. N81-14793
SPAGNI, G. N81-14406
SPEARS, W. D. N81-14625
SPERLING, J. L. N81-14874
SPIEWECK, F. N81-14308
SPORTELLI, L. N81-14850
SPRADLEY, L. W. N81-14696
SRINIVASAN, R. N81-14267
ST.CLAIR, A. K. N81-14080
ST.CLAIR, T. L. N81-14078
N81-14080
N81-14081
STACK, T. R. N81-14642
STAHL, B. N81-14273
STANGE, H. N81-13927
STARKS, M. N81-13988
STEARMAN, R. O. N81-13955
STEGER, J. L. N81-14722
N81-14723
STEINHAUSER, R. N81-13970
STELZEL, F. N81-14188
STENZEL, R. A. N81-14123
STEPHENS, J. B. N81-14287
STEUER, K. H. N81-14298
STIEGLITZ, R. N81-14922
STIEWITT, H. N81-14791
STIMPFLING, A. N81-14300
STOELTZING, R. W. N81-14416
STOERMER, E. F. N81-14610
STOKES, H. T. N81-14824
STONE, G. N81-14593
STONE, N. H. N81-14530
STONE, R. S. N81-14885
STONE, S. N. N81-14544
STRAHLE, W. C. N81-14108
STRAKA, W. C. N81-14940
STRASBURG, A. C. N81-14112
STRICKLAND, G. N81-14477
STRICKLER, D. J. N81-14886
STRONACH, C. E. N81-14801
STUCKAS, K. J. N81-13963
STUFFLEBEAM, J. H. N81-14876
STURSBERG, K. N81-14030
SUGIMURA, T. N81-14542
SUGIRA, M. N81-14955
SUGIYAMA, L. N81-14869
SUH, N. P. N81-14064
SUPPANZ, M. J. N81-14168
SURESH, S. N81-14066
SURLES, T. N81-14125
N81-14515
SUTHERLAND, C. D. N81-14544
SUTTON, G. P. N81-14333
SWANSON, R. C., JR. N81-13919
SWARTZ, P. F. N81-14805
SWEET, W. N81-14583
SWENSON, G. R. N81-14946
SWIFT, W. M. N81-14056
SZEDON, J. R. N81-14441
SZIKLAS, E. A. N81-14876
SZODRUCH, J. N81-14265
SZUSZCZEWICZ, E. P. N81-14952

T

TACINA, R. R. N81-14396
TACKETT, K. M. N81-14521
N81-14521
TAKAHASHI, H. N81-14889
TAKAYANAGI, T. N81-14176
N81-14177
TALBERT, D. M. N81-14927
TALBERT, S. G. N81-14492
TAMEO, R. P. N81-13965
TAN, C. I. N81-14912
TANAKA, M. N81-14845
TANEJA, V. N81-14772
TANNER, M. N81-13928
TATOM, F. B. N81-14724
TATUM, K. E. N81-14725
TAUER, M. N81-14835
TAWARA, H. N81-14847
TAYLOR, J. D. N81-14179
TAYLOR, R. J. N81-14907
TEATS, F. G. N31-14056
TEMME, N. M. N81-14737
N81-14747
TEMOFONTE, T. A. N81-14441
TEOFILO, V. L. N81-14883
TERASAWA, T. N81-14844
TERIELE, H. J. J. N81-14746
THAYER, P. A. N81-14547
THER, D. T. N81-13940
THOMAS, C. L. N81-14836
THOMAS, D. B. N81-14501
THOMAS, G. N81-14459
THOMAS, G. F. N81-14306
THOMAS, R. L. N81-14130
THOMPSON, C. M. N81-14519
N81-14520
THOMPSON, G. L. N81-14768
N81-14916
THOMPSON, J. A. N81-14109
N81-14110
THOMPSON, J. F. N81-14692
N81-14726
THORNTON, J. A. N81-14419
THORNTON, J. B. N81-14182
THORNTON, R. N81-14509
THORSON, L. N81-14911
THRIFT, P. R. N81-14664
TIEMANN, W. N81-14854
TIERSTEN, H. F. N81-14011
TIGHE, N. J. N81-14095
TINSLEY, B. A. N81-14948
TIURI, M. N81-14190
N81-14374
N81-14578
N81-14935
TOHLINE, J. E. N81-14938
TOLENDINO, L. F. N81-14678
TOPLOSKY, J. N81-14066
TORENBEEK, E. N81-13951
TORR, D. G. N81-14947
TORR, M. R. N81-14947
TORVEN, S. N81-14860
TOWNSEND, D. P. N81-14322
TRACY, C. A. N81-14135
TRAEGAARDH, C. N81-14533
TREVOR, D. J. N81-14820
TRIJONIS, J. N81-14518
N81-14550
TROH, J. N81-14854
TSUI, T. L. N81-13989

TUCKER, J. V. N81-14649
N81-14652
N81-14653
TUNG, J. H. N81-14524
TURASHEV, A. N. N81-14173
TUREK, D. G. N81-14044
TURNER, R. E. N81-14552
N81-14553
TUROWSKI, R. N81-14403
TURSKY, W. N81-14236
TUTTLE, R. E. N81-14458

U

UDAYABHANU, V. N81-14768
UEDA, H. N81-14248
UEDA, Y. N81-14842
URPO, S. N81-14935
UTHE, E. E. N81-14382
N81-14514

V

VADUS, J. R. N81-14500
VAHALA, G. N81-14877
VAHLE, M. O. N81-14678
VANARSDALE, D. R. N81-14465
VANATTA, C. M. N81-14892
VANDEHULST, H. C. N81-14937
VANDERHEIJDEN, A. M. A. N81-14352
VANDERHOUWEN, P. J. N81-14731
N81-14735
VANDOREN, T. P. N81-14445
VANHEMELRIJCK, E. N81-14529
VANSLYKE, H. W. N81-14179
VANULDEN, A. P. N81-14189
VAUGHAN, W. W. N81-14567
VELTHUYS, B. N81-14607
VENEZIANI, S. N81-14406
VENTURINI, E. L. N81-14039
VERCHEVAL, J. N81-13983
VERNIKOS, J. N81-14606
N81-14613
VERWER, J. G. N81-14734
VIGOUREUX, P. N81-14803
VILARDO, M. N81-14593
VINSON, P. W. N81-13965
VITANYI, P. M. B. N81-14729
VOCAR, J. N81-14661
VOGEL, C. N81-14022
VOLD, C. L. N81-14065
VOLLTRAUER, H. N. N81-14032
VONBRADKE, M. N81-14242
VONBRIESEN, R. N81-14499
VONFUCHS, G. F. N81-14422
VONGRUENHAGEN, W. N81-14752
VORA, H. N81-14839
VOSS, P. N81-14898
VRABLE, D. L. N81-14832
VRIEZE, O. J. N81-14777

W

WADATI, M. N81-14846
WADLINGER, E. A. N81-14831
WAGNER-BARTAK, C. G. N81-14146
WAGNER, H. J. N81-14403
WAGNER, W. N81-13927
WAHL, G. N81-14401
WAKKER, K. F. N81-14373
WALA, P. N81-14217
WALDINGER, R. N81-14665
WALDROP, W. R. N81-14724
WALKER, J. C. G. N81-14947
WALKER, M. S. N81-14256
WALKER, P. L., JR. N81-14115
WALKER, R. E. N81-14165
WALLACE, C. J. N81-14076
WALLACE, D. A. N81-14158
WALLACE, D. L. N81-14775
WALSH, T. E., JR. N81-14305
WALTER, K. H. N81-14835
WALTON, R. D. N81-14468
WAMPLER, R. H. N81-14672
WANG, D. S. N81-14317
WANG, P. K. N81-14824
WANG, S. J. N81-14395
WARREN, A. D. N81-14317
WARSI, Z. U. A. N81-14726
WASH, C. H. N81-14580
WATON, G. N81-14787
WAX, S. G. N81-14012
WEAVER, E. A. N81-14569
WEAVER, O. L. N81-14804
WEAVER, T. A. N81-14939
WEBB, T., III N81-14591
WEBER, O. N81-13944
WEBER, S. L. N81-14131
WEBSTER, J. M. N81-14291
N81-14834
WEDAN, R. W. N81-14568
WEGMANN, H. D. N81-14400
WEHNELT, U. N81-14231
WEIGAND, B. L. N81-14087
WEIL, G. N81-14633
WEIMANN, K. N81-14401
WEINBERGER, M. C. N81-13985
WEINER, D. D. N81-14249
WEISGERBER, D. N81-14006
WENZLER, C. J. N81-14465
WERLE, M. J. N81-14702
WERNITZ, E. N81-14231
WERTHEIM, F. J. N81-14432
WHALEN, B. A. N81-14950
WHITE, A. F. N81-14471
WHITE, A. J. N81-14271
WHITE, D. N81-14244
WHITE, R. G. N81-14353
WHITE, R. J. N81-14151
WHITTAKER, T. M. N81-14580
WICHMANN, B. A. N81-14654
N81-14660
WIDMANN, D. N81-14226
WIEDERHORN, S. M. N81-14095
WILDENBERGER, R. J. N81-14243
WILLIAMS, D. H. N81-14519
N81-14520
WILLIAMS, G. R. N81-14338
WILLIAMS, I. N81-14170
WILLIAMS, W. D. N81-14275
WILLIAMSON, D. E. N81-14474
WILLINGHAM, C. E. N81-14883
WILLIS, J. E. N81-14818
WILLMANN, G. N81-14402
WILLSHIRE, W. L., JR. N81-14788
WILSON, C. H. N81-14017
WILSON, W. I. N81-14056
WINNINGHAM, J. D. N81-14955
WINTER, W. N81-14238
WINTERS, R. R. N81-14809
WISE, D. L. N81-14121
WISE, G. L. N81-14771
WISE, S. L. N81-14765
WISEMBERG, J. N81-14528
WITTENBERG, L. J. N81-14409
WITTENSTEIN, G. N81-13979
WITTLIFF, C. E. N81-13977
WITTWER, V. N81-14022
WOELFLE, R. N81-14237
WOHAK, K. N81-14231
WOJCIK, M. A. N81-14504
WOLCOTT, M. N81-14522
WOLF, H. P. N81-14232
WOLFBRANDT, G. N81-14399
WOLKENFELT, P. H. M. N81-14733
N81-14744
WOLLIN, H. F. N81-14184
WOLTJER, L. N81-14936
WONG, E. N81-14042
WOOD, D. N81-14729
WOOD, J. R. N81-14444
WOODMAN, A. L. N81-14084
WOOLLAM, J. A. N81-14103
WOOMBLE, R. N81-14105
WOOSLEY, S. E. N81-14939
WORMLEY, D. N. N81-14478
WORMOLD, C. N. N81-14776
WRIGGE, S. N81-14749
N81-14750
N81-14751
WRIGHT, I. G. N81-14073
WU, J. C. N81-14727
WULF, H. J. N81-14634
WYSKIDA, R. M. N81-14086

X

XENOS, E. C. N81-14372

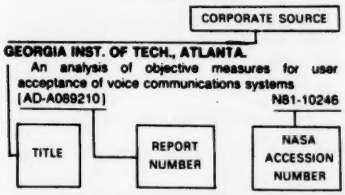
Y

YALLOP, B. D. N81-14941
YAMAMOTO, Y. N81-14765
YANG, J. Y. N81-14716
YARBERRY, V. R. N81-14640
YARRINGTON, R. M. N81-14430
N81-14463
YEE, S. Y. N81-14331
YEN, S. M. N81-14715
YESAVAGE, V. F. N81-14119
YIM, Y. J. N81-14123
YODER, J. R. N81-14639
YOUNG, C. G. N81-14075
YOUNG, E. R. N81-14947
YU, J. N81-14123
YU, K. N81-14499
YU, N. J. N81-14714
YURCZYK, R. F. N81-13940

Z

ZACKAY, V. F. N81-14069
ZAININGER, H. W. N81-14470
ZALOUDEK, F. R. N81-14466
ZARETSKY, E. V. N81-14322
ZEITLIN, B. A. N81-14256
ZINN, B. T. N81-14789
ZINN, J. N81-14544
ZOB, A. P. N81-14422
ZOLLARS, G. F. N81-13917
N81-13957
N81-14388
N81-14623
ZUMINO, B. N81-14549
ZURAWSKI, D. E. N81-14413
N81-14901
ZWAAL, A. N81-14156

Typical Corporate Source Index Listing



Listings in this index are arranged alphabetically by corporate source. The title of the document provides the user with a brief description of the subject matter. The report number helps to indicate the type of document cited (e.g., NASA report, translation, NASA contractor report). The NASA accession number denotes the number by which the citation is identified. The titles are arranged under each corporate source in ascending accession number order.

A

AEG-TELEFUNKEN, BERLIN (WEST GERMANY).
Investigation of the interaction between the power electric circuit and power supply systems
[BMFT-FB-T-79-115] N81-14235

AEG-TELEFUNKEN, FRANKFURT AM MAIN (WEST GERMANY).
Optical triggering of power thyristors
[BMFT-FB-T-79-168] N81-14238
Development of a crude gas/air fuel cell system
[BMFT-FB-T-79-103] N81-14404

AEG-TELEFUNKEN, HEILBRONN (WEST GERMANY).
Development of high complexity linear integrated circuits
[BMFT-FB-T-79-36] N81-14225
Development of technical integrated circuits
[BMFT-FB-T-79-41] N81-14228
Development of an electronic timepiece for technical applications
[BMFT-FB-T-79-88] N81-14232
Advanced ion implantation techniques
[BMFT-FB-T-79-37] N81-14897

AEG-TELEFUNKEN, ULM (WEST GERMANY).
Semiconductor crosspoints for direct replacement of electromechanical switches with high voltage requirements
[BMFT-FB-T-79-44] N81-14229
A 32 kbit CCD-memory-device
[BMFT-FB-T-79-105] N81-14634

AEG-TELEFUNKEN, WEDEL (WEST GERMANY).
Design and fabrication of terrestrial, photovoltaic solar generators for field testing in regions of intensive insolation
[BMFT-FB-T-79-34] N81-14400

AERITALIA S.P.A., TORINO (ITALY).
Effects of nonlinearities on wing store flutter
[MBB-FE-17/S/PUB/27] N81-13974

AEROCHEM RESEARCH LABS., INC., PRINCETON, N. J.
Prototype chemiluminescent analyzer for measurement of hydrazines
[AD-A091678] N81-14032

AEROJET LIQUID ROCKET CO., SACRAMENTO, CALIF.
Thermal protection of reentry vehicles by actively cooled nosetips N81-14165

AEROJET SERVICES CO., SACRAMENTO, CALIF.
Thermal protection of reentry vehicles by actively cooled nosetips N81-14165

AERONAUTICAL RESEARCH INST. OF SWEDEN, STOCKHOLM.
Downwash calculation at close range behind a trapezoidal wing in supersonic flow
[FFA-TN-AU-1661] N81-13925
Spectrum fatigue testing of simple test specimens containing artificial defects
[FAA-TN-HU-2108] N81-14354
Three dimensional spline-generated coordinate transformations for grids around wing-body configurations N81-14707

AERONAUTICAL SYSTEMS DIV., WRIGHT-PATTERSON AFB, OHIO.
Observing lightning from ground-based and airborne stations N81-14566

AEROSPACE CORP., EL SEGUNDO, CALIF.
Water-deuterium oxide exchange in polymers used in spacecraft applications N81-14159
Heatshield material selection for advanced ballistic reentry vehicles N81-14169
Solar thermal power systems
[DOE/CS-21036/01] N81-14489
Nucleosynthesis of neutron-rich heavy nuclei during explosive helium burning in massive stars
[ATR-81(8454)-2] N81-14939

AEROSPACE CORP., WASHINGTON, D. C.
Technology characterizations: Environmental information handbook
[DOE/EV-0072] N81-14426

AIR FORCE ACADEMY, COLO.
Processing of sequential and holistic stimuli in left and right visual fields
[AD-A091588] N81-14619
The USAFA/8086. A state of the art microprocessor system. Volume 1: System hardware
[AD-A091772] N81-14637
The USAFA/8086. A state of the art microprocessor system. volume 2: Software documentation
[AD-A091779] N81-14638

AIR FORCE INST. OF TECH., WRIGHT-PATTERSON AFB, OHIO.
Unidirectional composites as electrodes/preionization sources for CO2 tea lasers
[AD-A091407] N81-14012
An experimental study of methanol reformation
[AD-A091412] N81-14111
Latent heat induced divergence and the ultra-long waves of the subtropics and midlatitudes
[AD-A091408] N81-14585

AIR FORCE WEAPONS LAB., KIRTLAND AFB, N. MEX.
Neutron and gamma radiation effects on GaAlAs laser diodes
[AD-A091795] N81-14305

AIR FORCE WRIGHT AERONAUTICAL LABS., WRIGHT-PATTERSON AFB, OHIO.
Effects of downstream distance on turbulence decay for the compressor research facility low conditioning system
[AD-A091543] N81-14276

AIRCRAFT RESEARCH ASSOCIATION LTD., BEDFORD (ENGLAND).
An investigation into grid patching techniques N81-14708

AIRESEARCH MFG. CO., PHOENIX, ARIZ.
Numerical computations of swirling recirculating flow
[NASA-CR-165196] N81-14267

ALABAMA UNIV. IN HUNTSVILLE.
Temperature sensitive dynamic cushioning function development and validation for aircap cellular polyethylene
[AD-A091604] N81-14086
SPS Energy Conversion Power Management Workshop
[NASA-CR-163840] N81-14491

AMERICAN ENERGY RESEARCH CO., MCLEAN, VA.
Opportunities for coal to methanol conversion
[DOE/CS-50009/01] N81-14113

APPLIED PHYSICS LAB., JOHNS HOPKINS UNIV., LAUREL, MD.
Geothermal energy development in the eastern United States: Evaluation of potential geothermal resource areas
[PB80-212806] N81-14386
Geothermal energy development in the eastern Unites States geothermal space heating - Naval Air Rework Facility, Norfolk, Virginia
[PB80-217490] N81-14498
Geothermal energy development in the eastern United States. Geothermal space heating, Pittsville Middle/Elementary School, Pittsville, Maryland
[PB80-221088] N81-14499

ARGONNE NATIONAL LAB., ILL.
Support studies in fluidized-bed combustion
[PB80-218613] N81-14056
Alcohol production from agricultural and forestry residues
[DOE/EV-0108] N81-14125
Evaluation of advanced hydraulic turbomachinery for underground pumped hydroelectric storage. Part 1: Single-stage regulated pump turbines for operating heads of 500 to 1000 m
[ANL/ES-100-PT-1] N81-14328
Summary of solar energy technology characterizations
[DOE/EV-0099] N81-14450
Overview of the environmental concerns of coal transportation
[ANL/EES/TM-99] N81-14515
Improving the accuracy of computed matrix eigenvalues
[ANL-80-84] N81-14761

ARIZONA STATE UNIV., TEMPE.
Imaging of surfaces and defects of crystals
[DOE/ER-02995/4] N81-14903

ARKANSAS UNIV., FAYETTEVILLE.
Laser-photoacoustic detection of water pollutants, phase 1
[PB80-222250] N81-14524

ARMY ARMAMENT RESEARCH AND DEVELOPMENT COMMAND, WATERVLIET, N. Y.
Determination of phase transformation temperatures of titanium-nickel using differential thermal analysis
[AD-A091792] N81-14062

ARMY AVIATION RESEARCH AND DEVELOPMENT COMMAND, HAMPTON, VA.
Wind-tunnel test of an articulated helicopter rotor model with several tip shapes
[NASA-TM-80080] N81-13918

ARMY CONCEPTS ANALYSIS AGENCY, BETHESDA, MD.
PROGTEST: A computer system for the analysis of computational computer programs
[AD-A091653] N81-14667

ARMY ENGINEER TOPOGRAPHIC LABS., FORT BELVOIR, VA.
Antifact removal in frequency domain compressed imagery
[AD-A091533] N81-14683

ARMY MATERIALS AND MECHANICS RESEARCH CENTER, WATERTOWN, MASS.
Some aspects of materials and structures engineering with ceramics for engine applications
[AD-A091547] N81-13967
ARMY MATERIEL SYSTEMS ANALYSIS ACTIVITY, ABERDEEN PROVING GROUND, MD.
A Monte Carlo model for determining copperhead probability of acquisition and maneuver
[AD-A091587] N81-13988
SEEFAR: An improved model for producing line-of-sight maps
[AD-A091855] N81-14377
ARMY MOBILITY EQUIPMENT RESEARCH AND DEVELOPMENT CENTER, FORT BELVOIR, VA.
Lead acid battery pulse discharge investigation
[DOE/CH-00128/1] N81-14427
ARMY TEST AND EVALUATION COMMAND, ABERDEEN PROVING GROUND, MD.
Aircraft icing instrumentation: Unfilled needs
N81-14560
ARO, INC., ARNOLD AIR FORCE STATION, TENN.
An evaluation of wind tunnel test techniques for aircraft nozzle afterbody testing at transonic Mach numbers
[AD-A091775] N81-13931
Evaluation of wind tunnel nozzle afterbody test techniques utilizing a modern twin engine fighter geometry at Mach numbers from 0.6 to 1.2
[AD-A091545] N81-13932
Heat-transfer tests on a full and 1/4 scale aim-9E sidewinder missile and a 1/15 scale GBU-8 guided bomb unit at Mach numbers 1.5, 2.0 and 2.5
[AD-A091805] N81-13987
New methods to detect particle velocity and mass flux in arc-heated ablation/erosion facilities
N81-14166
Laser-Raman/Rayleigh flow diagnostic techniques applied to subsonic flow
[AD-A091695] N81-14275
ATMOSPHERIC SCIENCES LAB., WHITE SANDS MISSILE RANGE, N. MEX.
Ceiling and visibility instrumentation within government agencies N81-14565
Meteorological measurement system for support of atmospheric propagation studies
[UCRL-84547] N81-14594
A crosswind measurement module for the model 2 optical C sub n-2 instrument
[PB80-217607] N81-14600
ATOMIC WEAPONS RESEARCH ESTABLISHMENT, ALDERMASTON (ENGLAND).
A quick accurate method for calculating temperatures arising from rectangular and circular microcircuit heat sources
[AWRE-O-30/80] N81-14241
AUTOMATION INDUSTRIES, INC., SILVER SPRING, MD.
Wind shear systems integration plan, VICON (visual confirmation) reliability analysis
[PB80-218233] N81-13949
AVCO-EVERETT RESEARCH LAB., MASS.
Fusion driver study
[DOE/DP-40006/1] N81-14872

B

BABCOCK AND WILCOX CO., ALLIANCE, OHIO.
Study of seed reprocessing systems for open cycle coal fired MHD power plants. Task 1: Selection of processes for more detailed study
[DOE/ET-15613/T1] N81-14435
BATTELLE COLUMBUS LABS., OHIO.
Computer simulations for the microscopic mechanism of hot gas erosion
[AD-A091859] N81-14060
Development of MIL-HDBK-5 design allowable properties for several aerospace materials
[AD-A091602] N81-14063
High-temperature erosion-corrosion of alloys
[EPRI-CS-1454] N81-14073
Thermal stress response of General Purpose Heat Source (GPHS) aeroshell material N81-14167
Solar energy employment and requirements, 1978 - 1985. Summary and highlights
[DOE/TIC-1154] N81-14461
Development of a low-cost black-liquid solar collector, phase 2
[DOE/CS-30171/2A] N81-14492
BATTELLE HUMAN AFFAIRS RESEARCH CENTERS, SEATTLE, WASH.
Conceptual framework for describing selected urban and community impacts of federal energy policies
[PNL-3492] N81-14929
BATTELLE PACIFIC NORTHWEST LABS., RICHLAND, WASH.
Air oxidation and seawater corrosion Hastelloy S and Hastelloy C-4
[PNL-3344] N81-14072
Methane or methanol via catalytic gasification of biomass
[PNL-SA-8049] N81-14131
Residential heating costs: A comparison of geothermal solar and conventional resources
[PNL-3200] N81-14464
Advanced concepts test facility: Measurements and suggested test plan
[EPRI-CS-1530] N81-14466
Preconceptual design and assessment of a Tokamak hybrid reactor
[PNL-2720] N81-14883
Conceptual framework for describing selected urban and community impacts of federal energy policies
[PNL-3492] N81-14929
BDM CORP., MCLEAN, VA.
Measurements of microwave transmission characteristics through various configurations of fluidized bed materials
[DOE/MC-14143/T1] N81-14208
BECHTEL NATIONAL, INC., SAN FRANCISCO, CALIF.
Ethanol production for automotive fuel usage
[DOE/ID-12050/3] N81-14123
BENDIX CORP., KANSAS CITY, MO.
Experimental modeling of laminar composites for multifrequency eddy current measurements
[BDX-613-2482] N81-14014
Ultrasonic aluminum wire bonding
[BDX-613-2485] N81-14330
BERKELEY INDUSTRIES, LAGUNA BEACH, CALIF.
Performance of a flight qualified, thermoelectrically temperature controlled QCM sensor with power supply, thermal controller and signal processor N81-14158
BIHRLE APPLIED RESEARCH, INC., JERICHO, N. Y.
Rotary balance data for a single-engine agricultural airplane configuration for an angle-of-attack range of 8 deg to 90 deg
[NASA-CR-3311] N81-13923
BOEING AEROSPACE CO., SEATTLE, WASH.
IUS solid rocket motor contamination prediction methods N81-14157
Method and apparatus for fabricating improved solar cell modules
[NASA-CASE-NPO-14416-1] N81-14389
BOEING CO., SEATTLE, WASH.
Grid generation for general three-dimensional configurations N81-14714
BOEING COMMERCIAL AIRPLANE CO., SEATTLE, WASH.
A system for aerodynamic design and analysis of supersonic aircraft. Part 2: User's manual
[NASA-CR-3352] N81-13920
BOEING COMPUTER SERVICES, INC., SEATTLE, WASH.
Developing and upgrading of solar system thermal energy storage simulation models
[DOE/CS-34482/4] N81-14422
BOEING MILITARY AIRPLANE DEVELOPMENT, SEATTLE, WASH.
Advanced ejection seat for high dynamic pressure escape. Wind tunnel test
[AD-A091810] N81-13940
Boundary-fitted coordinate systems for arbitrary computational regions N81-14713
BOLT, BERANEK, AND NEWMAN, INC., CAMBRIDGE, MASS.
A preliminary analysis of the audible noise of constant speed, horizontal axis wind turbine generators
[DOE/EV-0089] N81-14799
BOOZ-ALLEN AND HAMILTON, INC., BETHESDA, MD.
Assessment of industrial activity in the utilization of biomass for energy
[DOE/PE-70090/01] N81-14457
BRANDEIS UNIV., WALTHAM, MASS.
Research in elementary particle physics
[DOE/ER-03230/T1] N81-14813
BRIGHAM YOUNG UNIV., PROVO, UTAH.
Investigation of sulfur-tolerant catalysts for selective synthesis of hydrocarbon liquids from coal derived gases
[DOE/ET-14809/3] N81-14118
BRITISH AEROSPACE DYNAMICS GROUP, BRISTOL (ENGLAND).
Handbook of satellite pointing errors and their statistical treatment
[ESS/SS-997] N81-13985
BROOKHAVEN NATIONAL LAB., UPTON, N. Y.
Problem of phase transitions in nuclear structure
[BNL-28357] N81-13998
Photoproduction of hydrogen by membranes of green photosynthetic bacteria
[BNL-28334] N81-14129
Strategic cost-benefit analysis of energy policies: Comparative analysis
[BNL-51128] N81-14469
Ammonia as a hydrogen energy-storage medium
[BNL-28293] N81-14477
BROOKINGS INSTITUTION, WASHINGTON, D. C.
Mitigating strategies for CO2 problems
[DOE/EV-10281/T2] N81-14511
BROWN, BOVERI UND CIE, A.G., HEIDELBERG (WEST GERMANY).
Passivation of silicon power devices by thermal oxidation
[BMFT-FB-T-79-48] N81-14401
BROWN UNIV., PROVIDENCE, R. I.
Two phase flow studies
[DOE/ET-27225/13] N81-14278
Global temperature patterns 6000 years ago
[DOE/EV-100097/1] N81-14591
Control of dynamical systems
[AD-A091704] N81-14686
Stability and bifurcation in a parabolic equation
[AD-A091645] N81-14753
Nuclear excitations and reaction mechanisms
[DOE/ER-03235/1] N81-14825
A research program in theoretical high-energy physics
[COO-3130TA-352] N81-14912

C

CALIFORNIA INST. OF TECH., PASADENA.
Theoretical investigation of lunar and planetary interiors
[NASA-CR-163822] N81-14365
Convection, composition and the thermal state of the lower mantle N81-14366
Plate tectonics on Venus N81-14367
Hotspots, basalts and the evolution of the mantle N81-14368
Basaltic volcanism contribution N81-14369
CALIFORNIA STATE COLL., BAKERSFIELD.
The design construction and testing of a liquid-heating flat-plate solar collector
[DOE/CS-34223/T1] N81-14458
CALIFORNIA UNIV., BERKELEY.
On-line Zeeman atomic absorption spectroscopy for mercury analysis in oil shale gases
[PB80-216922] N81-14055
Low alloy steels that minmize the hydrogen-carbide reaction, part 1
[DOE/ER-70296/T1] N81-14069
Phase-equilibria for design of coal gasification processes. Dew points of hot gases containing condensible tars
[DOE/ET-10603/T1] N81-14120
Research in computer simulation of integrated circuits
[AD-A091609] N81-14245
Comparative assessment of five potential sites for hydrothermal magma systems: Geochemistry
[LBL-11410] N81-14471
A survey of acid precipitation in northern California
[PB80-225311] N81-14523
Photoelectron photoion molecular beam spectroscopy
[LBL-11434] N81-14820
CALIFORNIA UNIV., BERKELEY. LAWRENCE BERKELEY LAB.
TPC magnet cryogenic system
[LBL-10552] N81-14179
Summary of solar energy technology characterizations
[DOE/EV-0099] N81-14450

Two well storage systems for combined heating and airconditioning by groundwater heatpumps in shallow aquifers
[LBL-11302] N81-14472

CALIFORNIA UNIV., DAVIS.
California Water Resources Center: chronicle of research, 1957-1980
[PB80-222276] N81-14384

CALIFORNIA UNIV., LIVERMORE.
Recent advances in Pt coating of microspheres by a batch magnetron sputtering process
[UCRL-84478] N81-14074
Six kilowatt, residential photovoltaic power systems study; design, performance, economics, market potential
[UCID-18776] N81-14487

CALIFORNIA UNIV., LIVERMORE. LAWRENCE LIVERMORE LAB.
Properties of lead-lithium solutions
[UCRL-84273] N81-14052
Analysis of explosive composite RX-14-AE (HMX/polythylene/oleic acid)
[UCID-18785] N81-14132
Technology of machine tools, volume 1. Executive summary
[UCRL-52960-1] N81-14333
Technology of machine tools. Volume 4: Machine tool controls
[UCRL-52960-4] N81-14334
Numerical solution of initial-value problems in plasma physics
[UCRL-85033] N81-14891
National mirror fusion program plan
[UCAR-10042-80] N81-14892
Technology of direct conversion for mirror reactor end-loss plasma
[UCRL-84235] N81-14893
Model for ion confinement in a hot-electron tandem mirror anchor
[UCID-18802] N81-14894
Effects of dimensionality and boundary conditions on thermal calcuations
[UCID-18681] N81-14911

CALIFORNIA UNIV., LOS ANGELES.
Analysis of spectral diffusion of localized triplet spin transitions within an inhomogeneous profile
[AD-A091714] N81-14033
Electrochromic glasses
[AD-A091641] N81-14088
Dual methods and approximation concepts in structural synthesis
[NASA-CR-3226] N81-14347

CALIFORNIA UNIV., SAN FRANCISCO.
Computerized tomographic determination of spinal bone mineral content
[NASA-CR-160891] N81-14615

CALIFORNIA UNIV., SANTA BARBARA.
Life from a plantary perspective: Fundamental issues in global ecology N81-14503
Inequalities connecting eigenvalues and nonprincipal subdeterminants
[AD-A091503] N81-14786

CALSPAN ADVANCED TECHNOLOGY CENTER, BUFFALO, N.Y.
Landing flying qualities evaluation criteria for augmented aircraft
[NASA-CR-163097] N81-13969
Vibrational energy transfer kinetics in molecular disequilibrium
[DOE/ER-10458/1] N81-14815

CALSPAN CORP., BUFFALO, N. Y.
Further investigations of adaptive-wall wind tunnels
[AD-A091774] N81-13977

CARNEGIE-MELLON UNIV., PITTSBURGH, PA.
Profit maximization models for exponential decay processes
[AD-A091522] N81-14768
The solution of manpower planning problems by the forward simplex method
[AD-A091521] N81-14916

CASE WESTERN RESERVE UNIV., CLEVELAND, OHIO.
Plastic deformation in oxide ceramics
[DOE/ER-04217/T1] N81-14091

CENTRAL ELECTRICITY GENERATING BOARD, SOUTHAMPTON (ENGLAND).
A camera device for the measurement of pin bowing in AGR fuel elements
[TDB-350] N81-14291
A grainless focusing screen for cameras, microscopes and other optical instruments
[TDB-347] N81-14834
Improvements in the digitizing of analogue information
[TDB-343] N81-14919

CENTRO INFORMAZIONI STUDI ESPERIENZE, MILAN (ITALY).
Quasi elastic light scattering from macromolecules in solution
[CISE-1528] N81-14083
A laser Doppler velocimeter for pulsatile water flow measurements in resonant hydraulic circuits
[CISE-1521] N81-14269
Asymptotic analysis of a co-focal unstablet resonator without active media
[CISE-1526] N81-14301
The RETE project. Integrated public and private cogeneration
[CISE-1527] N81-14406

CHALMERS UNIV. OF TECHNOLOGY, GOTEBORG (SWEDEN).
A time-discrete Boltzmann equation
[CTH-MATH-1980-1] N81-14782

CHICAGO UNIV., ILL.
Methods in probability and statistical inference
[COO-2751-4] N81-14775

CINCINNATI UNIV., OHIO.
Boundary-fitted coordinates for regions with highly curved boundaries and reentrant boundaries N81-14709

CITY COLL. OF THE CITY UNIV. OF NEW YORK.
Steepest edge algorithms in linear and nonlinear programming
[AD-A091608] N81-14662

COLLEGE OF WILLIAM AND MARY, WILLIAMSBURG, VA.
Most probable ideal magnetohydrodynamic equilibria? 1: Tokamak regime and quasi-force-free states
[DOE/ET-53045/1] N81-14877
Most probable ideal magnetohydrodynamic equilibria. 2: Reversed field pinch regime
[DOE/ET-53045/2] N81-14878

COLORADO SCHOOL OF MINES, GOLDEN.
Enthalpy measurement of coal-derived liquids
[DOE/ET-13395/3-4] N81-14119
Characterizing and improving the toughness of thick-sectioned 21/4Cr-1Mo electroslag weldments
[DOE/ET-12313/T1] N81-14344

COLORADO STATE UNIV., FORT COLLINS.
Performance evaluation of a state-of-the-art solar air-heating system with auxiliary heat pump
[DOE/CS-30122/4] N81-14490

COLUMBIA GAS CORP., OHIO.
Solar heating, cooling and domestic hot water system installed at Columbia Gas System Service Corporation, Columbus, Ohio
[NASA-CR-161603] N81-14394

COMMITTEE ON APPROPRIATIONS (U. S. SENATE).
Department of Housing and Urban Development, and certain independent agencies appropriations, fiscal year 1981, part 2
[GPO-62-143] N81-14926

COMMITTEE ON PUBLIC WORKS AND TRANSPORTATION (U. S. HOUSE).
Aviation safety: Interior compartment materials
[GPO-50-388] N81-13933
Testimony of Elwood T. Driver, Vice Chairman, National Transportation Safety Board, accompanied by Gerrit J. Walhout, Chief, Human Factors Division, and Matthew M. McCormick, Senior Air Safety Investigator, Human Factors Division N81-13934
Testimony of James J. Kramer, Associate Administrator for Aeronautics and Space Technology, National Aeronautics and Space Administration, accompanied by John H. Enders, Project Manager, Aviation Safety Technology Office, John A. Parker, Chemical Research Projects Office, NASA-Ames Research Center, and Demitrius A. Kourtides, Chemical Research Projects Office, NASA-AMES Research Center N81-13935
Testimony of Richard W. Taylor, Vice President and Special Assistant to the President, and Eugene A. Bara, Chief Engineer, Payloads Systems, Boeing Commercial Airplane Company N81-13936
Testimony of a panel consisting of: Lloyd E. Frisbee, Vice President, Engineering and Operations, Lockheed California Company; Lyle A. Wright, Director, Powerplant Engineering, Douglas Aircraft Company, accompanied by Doctor H. C. Schjelderup, Chief Technology Engineer, Materials and Process Engineering, and F. E. Duskin, Senior Design Engineer, Interiors Engineering, Douglas Aircraft Company N81-13937

COMMITTEE ON SCIENCE AND TECHNOLOGY (U. S. HOUSE).
Foresight. Volume 3: The economic impact of energy conservation
[GPO-41-483] N81-14390

COMMUNICATIONS RESEARCH CENTRE, OTTAWA (ONTARIO).
The WISP/HF system for Spacelab N81-14954

COMPUTER SCIENCES CORP., HAMPTON, VA.
A computer program for the generation of logic networks from task chart data
[NASA-CR-3364] N81-14646

COMPUTER SCIENCES CORP., SILVER SPRING, MD.
Evaluation of atmospheric density models and preliminary functional specifications for the Langley Atmospheric Information Retrieval System (LAIRS)
[NASA-CR-159374] N81-14554

CONSIGLIO NAZIONALE DELLE RICERCHE, ROME (ITALY).
Space research activity in Italy. Report to COSPAR N81-14959

CONSTRUCTION TECHNOLOGY LABS., SKOKIE, ILL.
Design criteria for deflection capacity of conventionally reinforced concrete slabs. Phase 1: State-of-the-art report
[AD-A091738] N81-14175
Design criteria for deflection capacity of conventionall reinforced concrete slabs. Phase 2: Design and construction requirements
[AD-A091517] N81-14176
Design criteria for deflection capacity of conventionally reinforced concrete slabs. Phase 3: Summary of design criteria and design and construction details; design examples
[AD-A091616] N81-14177

CONTROL DATA CORP., MINNEAPOLIS, MINN.
A new tropopause definition from simultaneous ozone temperature profiles
[AD-A091718] N81-14543

CORNELL UNIV., ITHACA, N. Y.
Mechanical properties of crystalline solids
[DOE/ER-02172/35] N81-14358
A boundary element formulation for planar time-dependent inelastic deformation of plates with cutouts
[DOE/ER-02733/26] N81-14359
Numerical analysis of planar, time-dependent inelastic deformation of plates with cracks by the boundary element method
[DOE/ER-02733/27] N81-14360
Boundary element analysis of time-dependent inelastic deformation of cracked plates loaded in anti-plane shear
[DOE/ER-02733/28] N81-14361
The inelastic bending of a nickel beam at several temperatures: Experiment and prediction
[DOE/ER-02733/29] N81-14362
Finite element analysis of time-dependent inelastic deformation in the presence of transient thermal stresses
[COO-2733-25] N81-14364

CORPS OF ENGINEERS, CHAMPAIGN, ILL.
Investigation of the minimum deployment time of a foam/fabric composite material
[AD-A091658] N81-14010

COUNCIL ON ENVIRONMENTAL QUALITY, WASHINGTON, D.C.
Global energy futures and the carbon dioxide problem N81-14502

D

DANISH METEOROLOGICAL INST., COPENHAGEN.
The quiet-time pattern of auroral arcs as a consequence of magnetospheric convection
[DMI-GEOPHYS-PAPERS-R-56] N81-14536

Occurrences of the polar slant E condition (SEC) at Marssarssuaq, Godhavn, Thule, 1978
[ISBN-87-7478-165-0] N81-14537

DARTMOUTH COLL., HANOVER, N.H.

An explicit model for two-dimensional tidal circulation using triangular finite elements: WAVETL user's manual
[PB80-226046] N81-14604

DAYTON UNIV., OHIO.

Design considerations for a thermal decomposition analytical system
[PB80-219116] N81-14054

Clear air turbulence forecasting techniques
N81-14573

DEFENCE RESEARCH INFORMATION CENTRE, ORPINGTON (ENGLAND).

The relationship between differential areas and *concentration in derivative absorption spectrophotometry*
[DRIC-TRANS-6127] N81-14029

DENISON UNIV., GRANVILLE, OHIO.

Determination of neutron cross sections and resonance parameters for the osmium isotopes 186, 187, and 188, Tl-205, S-32, the stable tellurium isotopes *and of the 82 keV inelastic cross section for U-238*
[DOE/ER-02696/9] N81-14809

DEPARTMENT OF ENERGY, AIKEN, S.C.

Long-term high-level waste technology program: *Strategy document*
[DOE/SR/WM-79/3-REV-4/80] N81-14829

DEPARTMENT OF ENERGY, LAS VEGAS, NEV.

Nevada Nuclear Waste Storage Investigations: *Quality*
[NVO-196-17] N81-14830

DEPARTMENT OF ENERGY, MORGANTOWN, W. VA.

Development of a simple fluidized-bed coal combustion model for the assessment of a pressurized fluidized-bed combustion system for electrical power generation
[DOE/METC/SP-80/15] N81-14044

Methane recovery from coalbeds. Project plan *document, FY 1981*
[DOE/TIC-11269] N81-14127

Effects of several trace contaminants on fuel cell performance
[DOE/METC/RI-80/16] N81-14455

DEPARTMENT OF ENERGY, WASHINGTON, D. C.

Synthetic fuels and the environment: An *environmental and regulatory impact analysis*
[DOE/EV-0087] N81-14122

Coal Gasification Quarterly Report, April - June 1979
[DOE/FE-0002-79/2] N81-14126

Underground natural gas storage in the United States 1979 - 1980 heating year
[DOE/EIA-0239/79] N81-14421

Energy policy study. Volume 10: Nuclear power regulation
[DOE/EIA-0201/10] N81-14423

Energy information referral directory, second quarter 1980
[DOE/EIA-0205/80-2Q] N81-14424

Technology characterizations: Environmental information handbook
[DOE/EV-0072] N81-14426

Solar energy: Program summary document
[DOE/CS-0050] N81-14428

Predesign energy analysis: A new graphic approach to energy conscious design for buildings
[DOE/CS-0171] N81-14449

Low energy futures for the United States
[DOE/PE-0020] N81-14456

S2KPLOT/DOEPLOT, *implementation* and programmers manual
[PB80-219926] N81-14671

S2KPLOT version 3.0, user's manual
[PB80-219934] N81-14674

Compact Toroid Theory Planning Workshop
[DOE/ER-0062] N81-14873

National mirror fusion program plan
[UCAR-10042-80] N81-14892

Cost and schedule control systems criteria for contract performance measurement: Implementation guide
[DOE/CR-0015] N81-14917

DESMATICS, INC., STATE COLLEGE, PA.

An examination of the performance of two-stage group screening for use in computer simulation
[AD-A091553] N81-14668

DETROIT DIESEL ALLISON, INDIANAPOLIS, IND.

Gas turbine engines and transmissions for bus *demonstration programs*
[COO-4867-07] N81-14329

DEUTSCHE FORSCHUNGS- UND VERSUCHSANSTALT FUER LUFT- UND RAUMFAHRT, BERLIN (WEST GERMANY).

Sound source location measurements on high speed trains
[DFVLR-MITT-79-15] N81-14791

DEUTSCHE FORSCHUNGS- UND VERSUCHSANSTALT FUER LUFT- UND RAUMFAHRT, BRUNSWICK (WEST GERMANY).

A contribution to stabilization of flight vehicle parachute systems
[DFVLR-MITT-80-05] N81-13926

Midair and near midair collisions on two- and three-dimensional curvilinear flight paths
[DFVLR-FB-80-13] N81-13944

Laminar-airfoils for transport aircraft
[DFVLR-MITT-80-07] N81-13952

Equipment for testing and measuring a 'helmet *mounted sight and display' system with a coupled movable television camera in the flight-simulator for* research of the DFVLR
[DFVLR-MITT-80-04] N81-13960

System identification of the longitudinal motion of the DFVLR HFB 320 research aircraft with particular consideration of control surface effectiveness
[DFVLR-MITT-79-16] N81-13971

Theoretical investigation of the influence of spoiler dynamics on the handling qualities of an aircraft with direct lift control
[DFVLR-FB-80-07] N81-13975

Experiments with thin-walled, isotropic cones subjected to axial load, axial load combined with *constant internal pressure and external hydrostatic* pressure
[DFVLR-MITT-80-02] N81-14348

Stabilization of the numerical integration of equations of motion
[DFVLR-FB-79-41] N81-14752

DEUTSCHE FORSCHUNGS- UND VERSUCHSANSTALT FUER LUFT- UND RAUMFAHRT, COLOGNE (WEST GERMANY).

Possibilities and limitations of Raman spectroscopy *in local temperature and concentration measurements* in flames
[DFVLR-FB-80-17] N81-14030

Influence of environment on constant load and fatigue crack propagation of titanium alloys Ti-6Al-4V and Ti-8Al-1Mo-1V
[DFVLR-FB-80-08] N81-14059

DEUTSCHE FORSCHUNGS- UND VERSUCHSANSTALT FUER LUFT- UND RAUMFAHRT, GOETTINGEN (WEST GERMANY).

Investigation of a transonic flow oscillation by real-time laser Doppler anemometry
[DFVLR-FB-80-04] N81-13924

Unsteady pressure distribution measurement on a rotating ellipsoid
[DFVLR-FB-80-18] N81-13927

Theoretical prediction of the base pressure for two-dimensional turbulent base flows at supersonic velocities
[DFVLR-FB-80-19] N81-13928

Analysis of unsteady pressure measurements on an aerofoil section with an harmonically oscillating, slotted flap
[DFVLR-FB-80-22] N81-13929

Stability of three-dimensional shear flows: Criteria for inviscid disturbance excitation
[DFVLR-FB-80-05] N81-14272

An investigation of turbulent wall-pressure fluctuations in a pipe downstream of an abrupt enlargement of its cross-sectional area
[DFVLR-FB-80-11] N81-14273

A computer-based laser Doppler velocimeter
[DFVLR-MITT-79-14] N81-14289

A general calculation method for the dynamic response to discrete gust distributions as exemplified by the rotorblade of a wind energy converter
[DFVLR-FB-80-12] N81-14408

Noise and noise abatement in fans and blowers: A review
[DFVLR-FB-80-16] N81-14796

DEUTSCHE FORSCHUNGS- UND VERSUCHSANSTALT FUER LUFT- UND RAUMFAHRT, HAMBURG (WEST GERMANY).

Changes of psychometric coefficients and factor structure as a function of test practice
[DFVLR-FB-80-15] N81-14622

DEUTSCHE FORSCHUNGS- UND VERSUCHSANSTALT FUER LUFT- UND RAUMFAHRT, OBERPFAFFENHOFEN (WEST GERMANY).

The collision course: Conditions, guidance laws and properties
[DFVLR-FB-80-06] N81-13942

Extension of proportional navigation by use of optimal filtering and control methods
[DFVLR-FB-80-10] N81-13943

Application of vector performance optimization to a robust control loop design for a fighter aircraft
[DFVLR-FB-80-14] N81-13970

System techniques, satellites, orbit design, thermal *control, power supply, attitude control, telemetry system*
[DFVLR-FB-79-37] N81-13984

Multipath induced errors, nonstatistical correction of position errors, correction of propagation anomalies
[DFVLR-MITT-79-17] N81-14188

Volumetric pattern prediction of antennas on aircraft *using the geometrical theory of diffraction*
[DFVLR-FB-80-01] N81-14195

Remote sensing of wind speed and direction by laser Doppler anemometer
[DFVLR-MITT-79-18] N81-14576

A literature study on visual motion accuity (minimum perceptible movement)
[DFVLR-MITT-80-06] N81-14618

Performed evaluation of unconstrained optimization techniques
[DFVLR-MITT-79-21] N81-14680

Optimal control nonlinear programming, spline interpolation, numerical software
[DFVLR-MITT-80-03] N81-14681

DEUTSCHE FORSCHUNGS- UND VERSUCHSANSTALT FUER LUFT- UND RAUMFAHRT, STUTTGART (WEST GERMANY).

Investigations and developments on a *Hall-Ion-Thruster*
[DFVLR-FB-80-09] N81-13994

Work function investigations at electrodes with adsorbed layers by measuring *contact potential differences in vapor atmosphere*
[DFVLR-FB-79-22] N81-14242

DRAVO CORP., PITTSBURGH, PA.

Grid and metric generation on the assembly of locally bi-quadratic coordinate transformations N81-14698

DU PONT DE NEMOURS (E. I.) AND CO., AIKEN, S.C.

Carolina Geological Society field trip guidebook, 11-12 October 1980. Geological investigations of Piedmont and triassic rocks, central North Carolina and *Virginia (with a field trip guide on the bedrock geology* of south central Virginia)
[DOE/SR-00001/T2] N81-14547

DYNAMIC CONTROLS, INC., DAYTON, OHIO.

Research and development of control actuation systems for aircraft. Volume 2. The evaluation of a force sharing and an active on-line fly-by-wire actuation system
[AD-A091559] N81-13976

An investigation of a digital electrohydraulic servovalve
[AD-A091563] N81-14326

DYNATECH CORP., CAMBRIDGE, MASS.

Bioconversion of biomass gasifier product gases to organic chemicals
[PB80-216641] N81-14135

DYNATECH R/D CO., CAMBRIDGE, MASS.

Liquid fuels production from biomass
[DOE/ET-200550/T1] N81-14121

E

EAGLE-PICHER INDUSTRIES, INC., MIAMI, OKLA.

Boron arsenide thin film solar cell development
[DOE/ET-23011/1] N81-14445

EDGERTON, GERMESHAUSEN AND GRIER, INC., IDAHO FALLS, IDAHO.

Tables of homogeneous equilibrium critical flow parameters for water in SI units
[EGG-2056] N81-14280

Application of microprocessors in measurement
[CONF-801116-1] N81-14641

EFFECTS TECHNOLOGY, INC., SANTA BARBARA, CALIF.
Rocket sled improved velocity measuring system feasibility study
[AD-A091634] N81-13978

EG AND G WASHINGTON ANALYTICAL SERVICES CENTER, INC., POCOMOKE CITY, MD.
Catalog of sea state and wind speed in the South Atlantic Bight
[NASA-CR-156872] N81-14601

EIC, INC., NEWTON, MASS.
Electrodeposition of polycrystalline and amorphous silicon for photovoltaic applications
[DOE/ET-23046/3] N81-14443

ELECTRIC POWER RESEARCH INST., PALO ALTO, CALIF.
Industrial cogeneration case studies
[EPRI-EM-1531] N81-14467

ENERGY TECHNOLOGY ENGINEERING CENTER, CANOGA PARK, CALIF.
Properties of lead-lithium solutions
[UCRL-84273] N81-14052

ENGELHARD MINERALS AND CHEMICALS CORP., EDISON, N. J.
Catalyst and process development for hygrogen preparation from future fuel cell feedstocks
[DOE/ET-15383-22] N81-14430
Catalyst and process development for hydrogen preparation from future fuel cell feedstocks
[DOE/ET-15383/18] N81-14463

ENGINEERING ANALYSIS, INC., HUNTSVILLE, ALA.
Curvilinear grids for sinuous river channels N81-14724

ENGINEERING SOCIETIES COMMISSION ON ENERGY, INC., WASHINGTON, D. C.
Alternate fuels for industrial combustion engines. Report on task 018
[FE-2468-77] N81-14130

ENVIRONMENTAL PROTECTION AGENCY, ANN ARBOR, MICH.
NOx national emission inventory estimates
[PB80-224058] N81-14522

ENVIRONMENTAL RESEARCH INST. OF MICHIGAN, ANN ARBOR.
Demonstration of an advanced solar garden with a water ceiling
[DOE/R5-10122/2] N81-14459

EUROPEAN SOUTHERN OBSERVATORY, MUNICH (WEST GERMANY).
Activities during 1979: Astronomical Research
[ISSN-0531-4496] N81-14936

EUROPEAN SPACE AGENCY, PARIS (FRANCE).
The faint object camera for the space telescope
[ESA-SP-1028] N81-14937

EUROPEAN SPACE RESEARCH AND TECHNOLOGY CENTER, NOORDWIJK (NETHERLANDS).
Outgassing tests on iras solar panel samples N81-14156

EXIDE MANAGEMENT AND TECHNOLOGY CO., YARDLEY, PA.
Research, development, and demonstration of lead-acid batteries for electric vehicle propulsion
[ANL/OEPM-79-8] N81-14930

EXXON NUCLEAR IDAHO CO., INC., IDAHO FALLS.
Heat transfer modeling for a non-fluidized particulate bed
[EGG/ENI-143] N81-14910

EXXON RESEARCH AND ENGINEERING CO., LINDEN, N.J.
Fundamental characterization of alternate fuel effects in continuous combustion systems
[DOE/ET-11313/T1] N81-14042
Hot corrosion/erosion testing of materials for application to advanced power conversion systems using coal-derived fuels. Task 2: Fluidized bed combustion
[FE-2452-39] N81-14071
Thin film polycrystalline silicon solar cells
[DOE/ET-23047/4] N81-14420

F

FARADAY LABS., INC., LA JOLLA, CALIF.
Interactions of surfaces with the solar plasma N81-14153

FEDERAL AVIATION ADMINISTRATION, ATLANTIC CITY, N.J.
Flight test investigation of LORAN-C for en route navigation in the Gulf of Mexico
[AD-A091637] N81-13945
Winds and wind shear in-situ sensors N81-14563

FEDERAL AVIATION ADMINISTRATION, OKLAHOMA CITY, OKLA.
Current aircraft survey (approach speeds, gross weights, and Dimensions)
[PB80-225691] N81-13956

FEDERAL AVIATION ADMINISTRATION, WASHINGTON, D.C.
Measuring weather for aviation safety in the 1980's N81-14568
Very short range forecasts of visibility and ceiling N81-14570

FEDERAL COMMUNICATIONS COMMISSION, WASHINGTON, D. C.
Rhyme test performance of ACSB (amplitude compandored single sideband), narrow band, and FM radios
[PB80-215932] N81-14217

FEDERAL COMPILER TESTING CENTER, FALLS CHURCH, VA.
Conversion products/aids survey, August 1980
[PB80-222029] N81-14673

FEDERAL COMPILER TESTING CENTER, WASHINGTON, D.C.
Datapoint 6600 COBOL 3.3
[PB80-219868] N81-14675
Sperry univac exec-8 operating system
[PB80-219876] N81-14676

FERMI NATIONAL ACCELERATOR LAB., BATAVIA, ILL.
Prospects for supergravity
[FERMILAB-CONF-80/74-THY] N81-14549

FIAT RESEARCH CENTER, ORBASSANO (ITALY).
Mechanical characterization of Si3N4 N81-14005

FIAT RESEARCH CENTER, TURIN (ITALY).
Some results on measurement of temperature and density in a flame by Raman spectroscopy N81-14019

FLORIDA POWER CORP., ST. PETERSBURG.
Grid and metric generation on the assembly of locally bi-quadratic coordinate transformations N81-14698

FLORIDA STATE UNIV., TALLAHASSEE.
Multiparameter hypothesis testing and acceptance sampling
[AD-A091607] N81-14340

FLORIDA UNIV., GAINESVILLE.
Mass synthesis for multiple balancing criteria of complex, planar mechanisms N81-14321

FLOW SIMULATIONS, INC., SUNNYVILLE, CALIF.
Numerical generation of two-dimensional grids by the use of Poisson equations with grid control at boundaries N81-14722
Use of hyperbolic partial differential equations to generate body fitted coordinates N81-14723

FOM-INSTITUUT VOOR PLASMAFYSICA, RIJNHUIZEN (NETHERLANDS).
The measurement of the ion energy distribution and the hot ion density decay in torturi
[REPT-80-122] N81-14868

FONDAZIONE UGO BORDONI, ROME (ITALY).
Telephone network behavior in repeated attempts environment: A simulation analysis
[FUB-15-1979] N81-14193
Performance of the Gradient Adaptive Equalizer with Inherent Optimal Adjusting Step in Presence of Noise and Arithmetic Errors
[FUB-35-1979] N81-14240

FRIEDRICHSFELD G.M.B.H., MANNHEIM (WEST GERMANY).
Production technology of beta-alumina ceramics for Na/S batteries
[BMFT-FB-T-79-57] N81-14402

G

GAS RESEARCH INST., CHICAGO, ILL.
Efficient utilization of alternate fuels: Development of models for the prediction of interchangeability, design, and performance of gas burner/combustor systems
[PB80-218282] N81-14134

GENERAL ATOMIC CO., SAN DIEGO, CALIF.
Strength and fracture characteristics of HTGR thermal barrier ceramics
[GA-A-15929] N81-14094
Measurement of stability of cabled conductors cooled by He 1 at reduced temperature, or He 2
[GA-A-16012] N81-14255
High temperature heat exchange: Nuclear process heat applications
[GA-A-16052] N81-14832
Medium-size high temperature gas-cooled reactor
[GA-A-15863] N81-14833

GENERAL ELECTRIC CO., ARLINGTON, VA.
The effects of symbology and spatial arrangement on the comprehension of software specifications
[AD-A091614] N81-14669

GENERAL ELECTRIC CO., LYNN, MASS.
Regenerative engine analysis
[AD-A091755] N81-13965

GENERAL ELECTRIC CO., PHILADELPHIA, PA.
Improved ceramic heat exchanger materials
[NASA-CR-159678] N81-14082
R. F. testing of the third generation defense communication satellite N81-14141
Development and demonstration of a Stirling/Rankine heat activated heat pump
[DOE/CS-20043/T1] N81-14283

GENERAL ELECTRIC CO., PITTSFIELD, MASS.
Study of electric field and ion effects on HVDC lines
[DOE/RA-50153/1] N81-14253

GENERAL ELECTRIC CO., SCHENECTADY, N. Y.
Development of high performance sintered Si3N4
[AD-A091757] N81-14008
Development of a HVDC prototype breaker
[DOE/ET-29054/1] N81-14251
Development of high-temperature turbine subsystem technology to a technology readiness status, phase 2
[FE-1806-72] N81-14332
Development of molten carbonate fuel cell power plant
[DOE/ET-17019/1] N81-14436
Alternate central receiver power system program, phase 2. Volume 1: Commercial plant design refinement
[DOE/SF-10535/1-1] N81-14460
Regenerative flywheel energy storage system. Volume 1: Executive summary
[UCRL-15290-VOL-1] N81-14484
Regenerative flywheel storage system, volume 2
[UCRL-15290-VOL-2] N81-14485
Regenerative flywheel energy storage system. Volume 3: Life cycle and cost-benefit analysis of a battery-flywheel electric car
[UCRL-15290-VOL-3] N81-14486

GENERAL ELECTRIC CO., ST. PETERSBURG, FLA.
Calcium/calcium chromate thermal battery and thermal battery assignment at the General Electric Neutron Devices Department
[GEPP-TIS-529] N81-14468
Ultrasonic cleaner evaluation
[GEPP-TIS-526] N81-14800

GENERAL ELECTRIC CO., UTICA, N. Y.
The use of the principle of superposition in measuring and predicting the thermal characteristics of an electronic equipment operated in a space environment N81-14161

GENERAL ELECTRIC CO., WILMINGTON, MASS.
Acoustic fuel quantity measurement system. Signal conditioning unit
[AD-A091758] N81-13961

GEORGE WASHINGTON UNIV., WASHINGTON, D.C.
Analysis and development of image statistics and redundancy removal
[AD-A091600] N81-14381
Measurement of the harmonic content across a bounded ultrasonic beam
[AD-A091646] N81-14798

GEORGIA INST. OF TECH., ATLANTA.
The drift, diffusion, and reactions of slow ions in gases
[AD-A091683] N81-14034
Development and application of the electrochemical etching technique
[DOE/EV-04814/T1] N81-14043
Combustion mechanisms of solid propellants
[AD-A091857] N81-14108

Conformal mapping of multiply connected regions onto regions with specified boundary shapes
N81-14712

A body-fitted conformal mapping method with grid-spacing control
N81-14727

Prediction of sound radiated from different practical jet engine inlets
[NASA-CR-163824] N81-14789

GEORGIA UNIV., ATHENS.
A multidisciplinary research program directed toward utilization of solar energy through bioconversion of renewable resources
[DOE/ER-00888/3] N81-14425

GLOBE-UNION, INC., MILWAUKEE, WIS.
Research, development and demonstration of lead-acid batteries for electric vehicle propulsion
[ANL/OEPM-79-9] N81-14933

GOODYEAR AEROSPACE CORP., AKRON, OHIO.
Feature tagging
[AD-A091691] N81-14378

Contour digitizing and tagging software (CONTAGRID)
[AD-A091736] N81-14661

GOETEBORG UNIV. (SWEDEN).
A time-discrete Boltzmann equation
[CTH-MATH-1980-1] N81-14782

GOULD, INC., ROLLING MEADOWS, ILL.
Research, development and demonstration of nickel-zinc batteries for electric vehicle propulsion
[ANL/OEPM-79-11] N81-14480

H

HAMILTON STANDARD, WINDSOR LOCKS, CONN.
Development of a preprototype sabatier CO2 reduction subsystem
[NASA-CR-160885] N81-14624

HAWAII UNIV., HONOLULU.
Development of an ASP (Air Stabilized Platform)
[PB80-221997] N81-14183

Internal tides and inertial oscillations as inferred from current and temperature measurements in the equatorial Pacific
[PB80-225568] N81-14603

HEBREW UNIV., JERUSALEM (ISRAEL).
ARID zone geosystems
[AD-A091689] N81-14379

HELSINKI UNIV. OF TECHNOLOGY, OTANIEMI (FINLAND).
Activities of the Radio Laboratory, 1977
[REPT-S-110] N81-14190

Calculation of traveling-wave wire antenna arrays with mutual impedances
[REPT-S-111] N81-14191

On the correspondence between two-dimensional real vector functions and functions of a complex variable and its application in electromagnetics
[REPT-S-112] N81-14223

The ability of passive microwave systems to detect sea ice
[REPT-S-113] N81-14374

Microwave signatures of snow measured in Finland
[REPT-S-109] N81-14578

Improvement of the sensitivity of millimeter wave radio telescopes by synchronous tracking
[REPT-S-108] N81-14935

HERZBERG INST. OF ASTRONOMY, OTTAWA (ONTARIO).
Spacelab energetic ion mass spectrometer
N81-14950

HIGH VACUUM EQUIPMENT CORP., HINGHAM, MASS.
Use of cryopumps on large space simulation systems
N81-14145

HONEYWELL CORPORATE TECHNOLOGY CENTER, BLOOMINGTON, MINN.
The development of fluorides for high power laser optics
[DOE/DP-40020/1] N81-14839

HOUSTON UNIV., TEX.
Pion interactions at medium energies
[DOE/ER-03948/12] N81-14814

HUGHES AIRCRAFT CO., CULVER CITY, CALIF.
An analytical transformation technique for generating uniformly spaced computational mesh
N81-14717

I

IDAHO STATE OFFICE OF ENERGY, BOISE.
Industrial application of geothermal energy in southeast Idaho
[DOE/ID-12010/4] N81-14454

IEA COAL RESEARCH, LONDON (ENGLAND).
Conversion to coal and coal/oil firing
[ICTS/TR-07] N81-14405

ILLINOIS INST. OF TECH., CHICAGO.
Electrochemistry of acetylides, nitrides and carbon cathodes in molten halides
[DOE/ER-04445/T1] N81-14041

ILLINOIS UNIV. AT URBANA-CHAMPAIGN.
Studies of convective heat transfer coefficient enhancement in two-phase, non-boiling flow
N81-14263

ILLINOIS UNIV. AT URBANA-CHAMPAIGN, URBANA.
Numerical methods for initial value problems
[AD-A091502] N81-14754

Automatic detection and treatment of oscillatory and/or stiff ordinary differential equations
[COO-2383-0068] N81-14759

Extracting unidimensional chains from multidimensional datasets: A graph theory approach
[AD-A091693] N81-14765

ILLINOIS UNIV., URBANA.
Effect of grid system on finite element calculation
N81-14715

NMR of small platinum particles
[DOE/ER-01198/1324] N81-14824

INDIANA UNIV., BLOOMINGTON.
Moment theory investigations of born approximation scattering phenomena
N81-14821

INDUSTRIEANLAGEN-BETRIEBSGESELLSCHAFT M.B.H., OTTOBRUNN (WEST GERMANY).
Solar panel thermal cycling testing by solar simulation and infrared radiation methods
N81-14164

INSTITUT D'AERONOMIE SPATIALE DE BELGIQUE, BRUSSELS.
Tables of artificial satellites, 1979
[AERONOMICA-ACTA-F-30-1980] N81-13983

Ion-exosphere with anisotropic velocity distribution
[AERONOMICA-ACTA-A-215-1980] N81-14527

Negative ion chemistry in the terrestrial D-region and signal flow graph theory
[AERONOMICA-ACTA-A-217-1980] N81-14528

Upper atmospheric winds
[AERONOMICA-ACTA-A-219-1980] N81-14529

INSTITUT FRANCO-ALLEMAND DE RECHERCHES, ST. LOUIS (FRANCE).
The Dalembertometer
[ISL-CO-220/79] N81-14292

Controls of aeronautical structures under fatigue testing by holographic pulsed lasers interferometry
[ISL-CO-218/79] N81-14300

Analysis method of the spatio-temporal structure of an acoustic field in the air with the aid of its optical Fourier transform
[ISL-CO-219/79] N81-14787

INSTITUT FUER ANGEWANDTE FESTKOERPERPHYSIK DER FRAUNHOFER GESELLSCHAFT E.V., FREIBURG IM BREISGAU (WEST GERMANY).
Investigation of electrochromic effects for display application
[BMFT-FB-T-79-42] N81-14022

INSTITUT FUER ANGEWANDTE GEODAESIE, FRANKFURT AM MAIN (WEST GERMANY).
Numerical aspects of orbit computation using series of kernel functions
[SER-A-89-MITT-155] N81-13980

INSTITUTE FOR TELECOMMUNICATION SCIENCES AND AERONOMY, BOULDER, COLO.
Environmental assessment for the Satellite Power System. Concept development and evaluation program: Effects of ionospheric heating on telecommunications
[DOE/ER-10003/T2] N81-14507

INSTITUTE OF ECOLOGY, INDIANAPOLIS, IND.
Role of Organic Soils in the World Carbon: Problem Analysis and Research Needs
[DOE/EV-10040/2] N81-14516

INSTITUTE OF GAS TECHNOLOGY, CHICAGO, ILL.
Urban waste conversion systems
[DSE-5580-T1] N81-14931

INSTITUUT VOOR KERNPHYSISCH ONDERZOEK, AMSTERDAM (NETHERLANDS).
Operation of multiwire drift chambers (MWDCs) in the QDD and QDQ focal planes
[INTERIKO-80/1] N81-14290

INTERCON WEATHER CONSULTANTS, INC., CAMP SPRINGS, MD.
The program of the Techniques Development Laboratory in aviation weather forecasting
N81-14574

INTERNATIONAL METEOROLOGICAL INST., STOCKHOLM (SWEDEN).
Air chemistry measurements in the lower atmosphere over Sweden: Data evaluation
[AC-45] N81-14533

INTERTECHNOLOGY SOLAR CORP., WARRENTON, VA.
Pressure harvesting of microalgae
[PB80-221781] N81-14609

IOWA STATE UNIV. OF SCIENCE AND TECHNOLOGY, AMES.
Grid evolution in time asymptotic problems
N81-14719

IOWA UNIV., IOWA CITY.
A Recoverable Plasma Diagnostics Package (RPDP) for Spacelab
N81-14956

IRT CORP., SAN DIEGO, CALIF.
Molecular beam studies of low energy reactions
[AD-A091611] N81-14806

ISTITUTO SUPERIORE DI SANITA, ROME (ITALY).
A parallel processing operating system for the multiprocessor SEM
[ISS-T-79/11] N81-14632

Electron spin resonance of homozygous beta thalassemic plasma
[ISS-P-79/13] N81-14850

J

JAYCOR, DEL MAR, CALIF.
Microwave heating of the ELMO bumpy torus relativistic electron ring
[DOE/ER-53092/13] N81-14874

JET PROPULSION LAB., CALIFORNIA INST. OF TECH., PASADENA.
Stark cell optoacoustic detection of constituent gases in sample
[NASA-CASE-NPO-14143-1] N81-14015

Membrane consisting of polyquaternary amine ion exchange polymer network interpenetrating the chains of thermoplastic matrix polymer
[NASA-CASE-NPO-14001-1] N81-14076

Frequency translating phase conjugation circuit for active retrodirective antenna array
[NASA-CASE-NPO-14536-1] N81-14185

Precise RF timing signal distribution to remote stations
[NASA-CASE-NPO-14749-1] N81-14186

Base drive for paralleled inverter systems
[NASA-CASE-NPO-14163-1] N81-14220

Low cost cryostat
[NASA-CASE-NPO-14513-1] N81-14287

Power control for hot gas engines
[NASA-CASE-NPO-14220-1] N81-14318

Seasat views North America, the Caribbean, and Western Europe with imaging radar
[NASA-CR-163825] N81-14372

Control and dynamics study for the satellite power system. Volume 1: MPTS/SPS collector dynamic analysis and surface deformation
[NASA-CR-163826] N81-14395

K

KANSAS STATE UNIV., MANHATTAN.
The chemistry of energetic fragments
[AD-A091823] N81-14031

KANSAS UNIV., LAWRENCE.
Development of empirical potential functions for the study of molecular geometry and applications to chlorophyll a dimers
[DOE/ER-02837-T1] N81-14810

KAW VALLEY STATE BANK AND TRUST CO., TOPEKA, KANS.
Solar heating, cooling, and domestic hot water system installed at Kaw Valley State Bank and Trust Company, Topeka, Kansas
[NASA-CR-161595] N81-14393

KENTUCKY UNIV., LEXINGTON.
Applications of multiconductor transmission line theory to the prediction of cable coupling: Volume 8. Prediction of cross talk involving braided shield cables
[AD-A091751] N81-14200

KERNFORSCHUNGSANLAGE, JUELICH (WEST GERMANY).
Energy analysis of solar energy systems, heat pumps and of improved insulation of single family houses
[BMFT-FB-T-79-101] N81-14403

KING RESEARCH, INC., ROCKVILLE, MD.
U.S. metric board 1979 survey of selected large U.S. firms and industries
[AD-A091618] N81-14178

L

LA JOLLA INST., CALIF.
Proceedings of the workshop on Modification of the Upper Atmosphere by Satellite Power System (SPS) Propulsion Effluents
[CONF-7906180] N81-14548

LEHIGH UNIV., BETHLEHEM, PA.
Fracture resistance of fatigue cracked welded details
[PB80-218217] N81-14336

LEYBOLD-HERAEUS G.M.B.H., HANAU/MAIN (WEST GERMANY).
Production of high purity metal and metal-alloy powders free of oxygen for subsequent processing of high-qualified sintering and semi-finished parts
[BMFT-FB-T-79-173] N81-14058

LIBRARY OF CONGRESS, WASHINGTON, D. C.
Foresight. Volume 3: The economic impact of energy conservation
[GPO-41-483] N81-14390

LINCOLN LAB., MASS. INST. OF TECH., LEXINGTON.
Evaluation of a CCD for analog delay
[AD-A091622] N81-14247
Solar photovoltaic/thermal residential experiment, phase 1
[DOE/ET-20279/103] N81-14437
Design and development of a seismic data center
[AD-A091621] N81-14924

LINFIELD RESEARCH INST., MCMINNVILLE, OREG.
Research on alkaline zinc secondary electrodes with emphasis on model
[DOE/RL-90369/8] N81-14257

LITTLE (ARTHUR D.), INC., CAMBRIDGE, MASS.
Commercialization strategy for lead/acid batteries in utility load leveling applications
[DOE/ET-26934/1] N81-14448
Distributed energy systems: A review of related technologies
[DOE/PE-03871/01] N81-14488

LOCKHEED AIRCRAFT SERVICE CO., PASADENA, CALIF.
Turbulence: From a pilot's viewpoint N81-14561

LOCKHEED ENGINEERING AND MANAGEMENT SERVICES CO., INC., HOUSTON, TEX.
Electron microprobe mineral analysis guide
[NASA-CR-160895] N81-14018
A multifrequency evaluation of active and passive microwave sensors for oil spill detection and assessment N81-14152
Floppy disk utility user's guide
[NASA-CR-160889] N81-14648

LOCKHEED-GEORGIA CO., MARIETTA.
Component-adaptive grid embedding N81-14697

LOCKHEED MISSILES AND SPACE CO., HUNTSVILLE, ALA.
Finite difference grid generation by multivariate blending function interpolation N81-14696

LOCKHEED MISSILES AND SPACE CO., PALO ALTO, CALIF.
Amorphous thin films for solar cell application
[DOE/ET-23040/2] N81-14419

LORD KINEMATICS, ERIE, PA.
Service life determination for the UH-60-A (UTTAS) helicopter elastomeric bearings
[AD-A091756] N81-14324

LOS ALAMOS SCIENTIFIC LAB., N. MEX.
Use of R-matrix methods for light element evaluations
[LA-UR-80-2673] N81-14050
Superconductor design and loss analysis for a 20 MJ induction heating coil
[LA-UR-80-2742] N81-14256
Ceramic heat pipe development
[DOE/TIC-11293] N81-14279
SOLA-VOF: A solution algorithm for transient fluid flow with multiple free boundaries
[LA-8355] N81-14281
BICYCLE: A comptuer code for calculating levelized life-cycle costs
[LA-8493-MS] N81-14341
Summary of solar energy technology characterizations
[DOE/EV-0099] N81-14450
Decentralized solar photovoltaic energy systems
[DOE/EV-0101] N81-14451
The characterization and assessment of selected solar thermal energy systems for residential and process heat applications
[DOE/EV-0102] N81-14452
Technology assessment of wind energy conversion systems
[DOE/EV-0103] N81-14453
Magnetic energy storage
[LA-UR-80-2589] N81-14473
Ionospheric effects of rocket exhaust products (HEAO-C, Skylab and SPS-HLLV)
[DOE/ER-0082] N81-14544
Statistical relationship between median visibility and conditions of worstcase manmade impact on visibility
[LA-UR-80-2485] N81-14550
Automated medical information system of the Los Alamos Scientific Laboratory
[LA-UR-80-2160] N81-14621
Three-dimensional space-charge calculation method
[LA-8531-MS] N81-14831
RMF concept: A rotating-magnetic-field technique for driving steady plasma currents in Compact Toroid devices
[LA-8516-MS] N81-14884
Effect of stellar structure on supernova remnant evolution
[LA-UR-80-2756] N81-14940

M

MARTIN MARIETTA CORP., BALTIMORE, MD.
Photochemistry and enzymology of photosynthesis
[DOE/ER-03326/90] N81-14607

MARTIN MARIETTA CORP., DENVER, COLO.
P78-2 (SCATHA) satellite thermal balance test, a laboratory test N81-14162
Solar central receiver hybrid power system, phase 1. Volume 3: Appendices
[DOE/ET-21038/1-VOL-3] N81-14418

MARTIN MARIETTA LABS., BALTIMORE, MD.
Investigation of surface plasmon dispersion
[AD-A091853] N81-14870

MARYLAND UNIV., COLLEGE PARK.
Radiation-induced crosslinking and grafting reactions in polyethylene
[DOE/ER-02845/T1] N81-14090
A unilateral representation for autoregressive random field models
[AD-A091644] N81-14664
Three dimensional digital technology
[AD-A091045] N81-14688

MASSACHUSETTS INST. OF TECH., CAMBRIDGE.
Wind tunnel tests of a Gerdien capacitor vehicle combination
[AD-A091719] N81-13986
Electronic and optical properties and modeling of intercalated graphite
[AD-A091858] N81-14009
Prevention of spline wear by soft metallic coatings
[AD-A091861] N81-14064
Influences of gaseous environment on low growth-rate fatigue crack propagation in steels
[DOE/ER-10389/1] N81-14066
Crossed reaction networks in the catalytic hydrodenitrogenation of synthetic liquid fuels
[DOE/PC-30094/1] N81-14124
Air/gas system dynamics of fossil fuel power plants. Volume 3: Experimental pressure test data of a 500 MW unit and of a 125 MW unit
[EPRI-CS-1444-VOL-3] N81-14478
Research in algebraic manipulation
[AD-A091675] N81-14755
The ballooning mode second stability region for sequences of Tokamak equilibria
[DOE/ET-53073/T1] N81-14869
Mechanism for diffusion induced grain boundary migration
[DOE/ER-05002/13] N81-14904
Kinetic processes at grain boundaries
[DOE/ER-05002/11] N81-14905

MASSACHUSETTS UNIV., AMHERST.
An analytical chemical system for the determination of heavy metals and organic compounds
[DOE/EV-04320/1] N81-14045
An analytical chemical system for the determination of heavy metals and organic compounds
[DOE/EV-04320/3] N81-14046
Application of fracture mechanics in assuring against fatigue failure of ceramic components
[PB80-213549] N81-14095
Infrared emission spectroscopy of low pressure gaseous discharges, 3
[AD-A091744] N81-14540

MATERIALS QUALITY ASSURANCE DIRECTORATE, LONDON (ENGLAND).
The control of microbial contamination of cutting fluid ZX-1
[MQAD-TP-727] N81-14338

MAXWELL LABS., INC., SAN DIEGO, CALIF.
Development of a high energy density capacitor for plasma thrusters
[AD-A091839] N81-13995

MCDONNELL AIRCRAFT CO., ST. LOUIS, MO.
Grid generation for two-dimensional finite element flowfield computation N81-14725

MESSERSCHMITT-BOELKOW-BLOHM G.M.B.H., OTTOBRUNN (WEST GERMANY).
Computational aerodynamic design tools and techniques used at fighter development
[MBB-FE-122/S/PUB/13] N81-13950
Active flutter suppression on an F-4F aircraft with external stores using already existing control surfaces
[MBB-FE-17/S/PUB/24] N81-13972
Active control of an explosive wing-store flutter case
[MBB-FE-17/S/PUB/25] N81-13973
Effects of nonlinearities on wing store flutter
[MBB-FE-17/S/PUB/27] N81-13974
Constant-amplitude and flight-by-flight tests on CERP specimens
[MBB-FE-2/S/PUB-26] N81-14006
Development and preparation of industrial scale manufacturing processes for a modular solar-assisted house-heating-system, phase 2B
[BMFT-FB-T-79-85] N81-14407

MICHIGAN STATE UNIV., EAST LANSING.
Performance characteristics of large aperture, ten-cell, atmospheric pressure isobutane Cerenkov counters
[DOE/ER-14529/1] N81-14509

MICHIGAN UNIV., DEARBORN.
Phytoplankton composition and abundance in Southern Lake Huron
[PB80-216013] N81-14610

MIDDLETON (DAVID), NEW YORK.
Threshold signal reception in electromagnetic interference environment. Part 1: Problems and approaches
[PB80-218753] N81-14216

MIDWEST RESEARCH INST., GOLDEN, COLO.
Liquid fuels production from biomass
[DOE/ET-200550/T1] N81-14121
Solar thermal power systems
[DOE/CS-04042/1] N81-14429
Community energy self-reliance
[SERI/CP-354-421] N81-14481
Quality-assurance needs and goals in solar energy conversion
[SERI/TP-641-773] N81-14483

MINNESOTA UNIV., MINNEAPOLIS.
The chemical composition of atmospheric precipitation in Minnesota and North Dakota
[DOE/EV-04327/1] N81-14510
Gauge theories and spontaneous symmetry breaking
[AD-A091800] N81-14804

MISSION RESEARCH CORP., SANTA BARBARA, CALIF.
ISIS topside sounder data gathered on Kwajalein Atoll during the summers of 1977 and 1978
[AD-A091845] N81-14539

MISSISSIPPI STATE UNIV., MISSISSIPPI STATE.
Grid generation using differential systems techniques N81-14692
Numerical generation of two-dimensional orthogonal curvilinear coordinates in an Euclidean space N81-14726
MISSOURI UNIV. -ROLLA.
Progress in wood gasification at the University of Missouri-Rolla
[CONF-800973-1] N81-14128
MITRE CORP., MCLEAN, VA.
Summary of solar energy technology characterizations
[DOE/EV-0099] N81-14450
MITRE CORP., WASHINGTON, D. C.
Technology characterizations: Environmental information handbook
[DOE/EV-0072] N81-14426
MOBIL TYCO SOLAR ENERGY CORP., WALTHAM, MASS.
A 25 kW solar photovoltaic flat panel power supply for an electrodialysis water desalination unit in New Mexico
[DOE/ET-23061/1] N81-14444
MONSANTO RESEARCH CORP., DAYTON, OHIO.
An evaluation of emission factors for waste-to-energy systems
[PB80-226665] N81-14521
MOTOROLA, INC., PHOENIX, ARIZ.
Market definition study of photovoltaic power for remote villages in developing countries
[NASA-CR-159880] N81-14391
MOUND LAB., MIAMISBURG, OHIO.
Combined Electrolysis Catalytic Exchange (CECE)
[MLM-2774] N81-14051
Salt-gradient solar ponds: Design, construction and power production
[MLM-2770(OP)] N81-14409

N

NAGOYA UNIV. (JAPAN).
Numerical simulation of density evolution in JIPP T-2 Tokamak
[IPPJ-483] N81-14841
Chaotically transitional phenomena in the forced negative-resistance oscillator
[IJJP-482] N81-14842
Relation between weibel instability and magnetic field generating thermal instability
[IPPJ-485] N81-14843
Numerical study of explosive tearing mode instability in one-component plasmas
[IPPJ-486] N81-14844
A computer simulation on microinstabilities and anomalous resistivity near the magnetic neutral sheet
[IJJP-487] N81-14845
On a new series of integrable nonlinear evolution equations
[IPPJ-484] N81-14846
Cross sections for charge transfer collisions involving hydrogen atoms
[IPPJ-AM-15] N81-14847
Confinement and heating of plasmas
[ISSN-0547-1567] N81-14848
Mixing length hypothesis in the dissipative trapped ion instability
[IPPJ-481] N81-14849
NATIONAL ACADEMY OF SCIENCES - NATIONAL RESEARCH COUNCIL, WASHINGTON, D. C.
Subcutaneous electrode structure
[NASA-CASE-ARC-11117-1] N81-14612
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION, WASHINGTON, D. C.
Aeronautical Engineering: A continuing bibliography with indexes, supplement 128, November 1980
[NASA-SP-7037(128)] N81-13914
Earth Resources: a continuing bibliography with indexes
[NASA-SP-7041(27)] N81-14371
Aerospace Medicine and Biology: A continuing bibliography with indexes, supplement 212
[NASA-SP-7011(212)] N81-14611
A simple numerical orthogonal coordinate generator for fluid dynamic applications N81-14710
Standard spacecraft procurement analysis: A case study in NASA-DoD coordination in space programs
[R-2619-RC] N81-14915
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. AMES RESEARCH CENTER, MOFFETT FIELD, CALIF.
Structural wood panels with improved fire resistance
[NASA-CASE-ARC-11174-1] N81-13999
Perfluoroalkyl polytriazines containing pendent iododifluoromethyl groups
[NASA-CASE-ARC-11241-1] N81-14016
Experimental study of supersonic viscous leeside flow over a slender delta wing
[NASA-TM-81248] N81-14265
Environmental impacts of the satellite power system (SPS) on the middle atmosphere
[NASA-TM-82228] N81-14508
Micro-fluid exchange coupling apparatus
[NASA-CASE-ARC-11114-1] N81-14605
Naloxone inhibits and morphine potentiates. The adrenal steroidogenic response to ACTH
[NASA-TM-81253] N81-14606
Subcutaneous electrode structure
[NASA-CASE-ARC-11117-1] N81-14612
Indometh acin-antihistamine combination for gastric ulceration control
[NASA-CASE-ARC-11118-2] N81-14613
Numerical generation of two-dimensional grids by the use of Poisson equations with grid control at boundaries N81-14722
Use of hyperbolic partial differential equations to generate body fitted coordinates N81-14723
Fragmentation in rotating isothermal protostellar clouds
[NASA-TM-82229] N81-14938
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. HUGH L. DRYDEN FLIGHT RESEARCH CENTER, EDWARDS, CALIF.
Clear air turbulence: Historical comments N81-14562
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. GODDARD SPACE FLIGHT CENTER, GREENBELT, MD.
System for a displaying at a remote station data generated at a central station and for powering the remote station from the central station
[NASA-CASE-GSC-12411-1] N81-14221
Energy transfer and quenching rates of laser-pumped electronically excited alkalis in flames
[NASA-TM-82230] N81-14303
Laser excitation of fluorescence in the A-X system of NH
[NASA-TM-82231] N81-14304
Device for coupling a first vehicle to a second vehicle
[NASA-CASE-GSC-12429-1] N81-14320
Coordinated ionospheric and magnetospheric observations from the ISIS 2 satellite by the ISIS 2 experimenters. Volume 3: High-latitude charged particle, magnetic field, and ionospheric plasma observations during northern summer
[NASA-TM-82223] N81-14532
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. LYNDON B. JOHNSON SPACE CENTER, HOUSTON, TEX.
Surface finishing
[NASA-CASE-MSC-12631-3] N81-14077
The 11th Space Simulation Conference
[NASA-CP-2150] N81-14138
Comprehensive testing of a defense systems communications satellite N81-14139
Effectiveness of spacecraft testing programs N81-14140
Pyrotechnic shock at the orbiter/external tank forward attachment N81-14142
Thermodynamic performance testing of the orbiter flash evaporator system N81-14143
Orbiter integrated active thermal control subsystem test N81-14144
Shuttle mission simulator N81-14148
A radiant heating test facility for space shuttle orbiter thermal protection system certification N81-14149
An effective combined environment test facility N81-14150
An interative approach to space-flight physiology using systems analysis and mathematical simulation N81-14151
A multifrequency evaluation of active and passive microwave sensors for oil spill detection and assessment N81-14152
STS-1 mission contamination evaluation approach N81-14154
Effects of the Shuttle Orbiter fuselage and elevon on the molecular distribution of water vapor from the flash evaporator system N81-14155
The identification of trends in outgassing technology N81-14160
Thermal vacuum performance testing of the Space Shuttle Orbiter radiator system N81-14163
Space Shuttle Orbiter nose cap and wing leading edge certification test program N81-14168
Coaxial phased array antenna
[NASA-CASE-MSC-16800-1] N81-14187
Installing fiber insulation
[NASA-CASE-MSC-16973-1] N81-14317
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. JOHN F. KENNEDY SPACE CENTER, COCOA BEACH, FLA.
Fire extinguishing apparatus having a slidable mass for a penetrator nozzle
[NASA-CASE-KSC-11064-1] N81-14137
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. LANGLEY RESEARCH CENTER, HAMPTON, VA.
A study of the sonic-boom characteristics of a blunt body at a Mach number of 6
[NASA-TP-1787] N81-13915
Wind-tunnel test of an articulated helicopter rotor model with several tip shapes
[NASA-TM-80080] N81-13918
Numerical solutions of the Navier-Stokes equations for transonic afterbody flows
[NASA-TP-1784] N81-13919
A computer program for the design and analysis of low-speed airfoils, supplement
[NASA-TM-81862] N81-13921
Passive control of wing/store flutter
[NASA-TM-81865] N81-13922
Evaluation of a computer-generated perspective tunnel display for flight path following
[NASA-TP-1736] N81-13958
Development of a computer program data base of a navigation aid environment for simulated IFR flight and landing studies
[NASA-TM-80064] N81-13959
Economic evaluation of flying-qualities design criteria for a transport configured with relaxed static stability
[NASA-TP-1760] N81-13968
Finite element structural model of a large, thin, completely free, flat plate
[NASA-TM-81887] N81-13992
Partial interlaminar separation system for composites
[NASA-CASE-LAR-12065-1] N81-14000
Effects of temperature, thermal exposure,and fatigue on an alumina/aluminum composite
[NASA-TP-1795] N81-14001
Review and developments of dissemination models for airborne carbon fibers
[NASA-TM-80216] N81-14002
Chemical kinetic models for combustion of hydrocarbons and formation of nitric oxide
[NASA-TP-1794] N81-14017
Method for preparing addition type polyimide prepregs
[NASA-CASE-LAR-12054-2] N81-14078
Crosslinking of aromatic polyamides via pendant propargyl groups
[NASA-TM-81918] N81-14080
Addition polyimide end cap study
[NASA-TM-81917] N81-14081
Method and tool for machining a transverse slot about a bore
[NASA-CASE-LAR-11855-1] N81-14319
Vibration characteristics of a steadily rotating slender ring
[NASA-TP-1775] N81-14343
Nonlinear dynamic response of a uni-directional model for the tile/pad space shuttle thermal protection system
[NASA-TM-81901] N81-14345
Fatigue properties of shuttle thermal protection system
[NASA-TM-81899] N81-14346
Numerical grid generation techniques
[NASA-CP-2166] N81-14690
Mesh generation using algebraic techniques N81-14693
Assessment of ground effects on the propagation of aircraft noise: The T-38A flight experiment
[NASA-TP-1747] N81-14788

Noise prediction for jetstar prop-fan test
[NASA-TM-81916] N81-14790

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. LEWIS RESEARCH CENTER, CLEVELAND, OHIO.

Changes in surface chemistry of silicon carbide (0001) surface with temperature and their effect on friction
[NASA-TP-1756] N81-14079

Atomic hydrogen storage method and apparatus
[NASA-CASE-LEW-12081-3] N81-14103

Comparisons of modified Vasco X-2 and AISI 9310 gear steels
[NASA-TP-1731] N81-14322

Catalytic combustion of coal-derived liquids
[NASA-TM-81594] N81-14396

Applicability of advanced automotive heat engines to solar thermal power
[NASA-TM-81658] N81-14397

Ultra-lean combustion at high inlet temperatures
[NASA-TM-81640] N81-14398

Effect of fuel nitrogen and hydrogen content on emissions in hydrocarbon combustion
[NASA-TM-81612] N81-14399

Icing instrumentation N81-14559

An electrostatic analog for generating cascade grids N81-14695

Fast Generation of body conforming grids for 3-D N81-14706

Generation of C-type cascade grids for viscous flow computation N81-14721

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. MARSHALL SPACE FLIGHT CENTER, HUNTSVILLE, ALA.

Skylab orbital lifetime prediction and decay analysis
[NASA-TM-78308] N81-13979

Space shuttle solid rocket booster recovery subsystem
[NASA-TM-82389] N81-13990

Steering law for parallel mounted double-gimbaled control moment gyros. Revision A
[NASA-TM-82390] N81-13991

The swept angle retarding mass spectrometer: Initial results from the Michigan auroral probe sounding rocket
[NASA-TM-78317] N81-14530

A preliminary look at AVE-SESAME 4 conducted on 9-10 May 1979
[NASA-TM-78314] N81-14552

AVE-SESAME IV: 25 mb sounding data
[NASA-TM-78315] N81-14553

Proceedings: Fourth Annual Workshop on Meteorological and Environmental Inputs to Aviation systems
[NASA-CP-2139] N81-14555

Survey of Workshops on Meteorological and Environmental Inputs to Aviation Systems N81-14556

Aviation meteorology research and development: A status report N81-14557

Federal Aviation Administration and National Weather Service Aviation Research and Development N81-14558

Aeronautical concerns and National Aeronautics and Space Administration atmospheric electricity projects N81-14567

The 1979 clear air turbulence flight test program N81-14569

Space plasma physics active experiments
[NASA-CP-2165] N81-14944

Spacelab experiment: ALAE. Atmospheric Lyman-Alpha Emissions N81-14945

Atmospheric Emission Photometric Imaging on Spacelab (AEPI) N81-14946

Measurement of visible and UV emission from Energetic Neutral Atom Precipitation (ENAP), on Spacelab N81-14948

Space Experiments with Particle Accelerators (SEPAC), status review, 23 September 1980 N81-14951

Magnetospheric multiprobes: Investigations and instrumentation N81-14955

Chemical release module facility N81-14957

Tether facility presentation N81-14958

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. PASADENA OFFICE, CALIF.

Stark cell optoacoustic detection of constituent gases in sample
[NASA-CASE-NPO-14143-1] N81-14015

Membrane consisting of polyquaternary amine ion exchange polymer network interpenetrating the chains of thermoplastic matrix polymer
[NASA-CASE-NPO-14001-1] N81-14076

Frequency translating phase conjugation circuit for active retrodirective antenna array
[NASA-CASE-NPO-14536-1] N81-14185

Precise RF timing signal distribution to remote stations
[NASA-CASE-NPO-14749-1] N81-14186

Base drive for paralleled inverter systems
[NASA-CASE-NPO-14163-1] N81-14220

Low cost cryostat
[NASA-CASE-NPO-14513-1] N81-14287

Power control for hot gas engines
[NASA-CASE-NPO-14220-1] N81-14318

Method and apparatus for fabricating improved solar cell modules
[NASA-CASE-NPO-14416-1] N81-14389

NATIONAL BUREAU OF STANDARDS, WASHINGTON, D.C.

The development of potential thin standards for calibration of X-ray fluorescence spectrometry
[PB80-220239] N81-14053

Application of fracture mechanics in assuring against fatigue failure of ceramic components
[PB80-213549] N81-14095

Recycled program: Phase 1-Test procedures for recycled oil used as burned fuel
[PB80-215536] N81-14133

Specifications, tolerances, and other technical requirements for weighing and measuring devices. 1980 edition
[PB80-213622] N81-14184

Measurement techniques for high power semiconductor materials and devices
[PB80-217623] N81-14261

Information and guidelines for a proposed laboratory accreditation and product certification program for photovoltaic energy conversion systems
[PB80-217615] N81-14501

Chemical kinetic and photochemical data sheets for atmospheric reactions
[AD-A091631] N81-14541

Prospectus for data dictionary system standard
[PB80-225204] N81-14643

Computer science and technology: Conversion
[PB80-215338] N81-14644

Problems used in testing the efficiency and accuracy of the modified Gram-Schmidt least squares algorithm
[PB80-219777] N81-14672

Relevance of the second law of thermodynamics to energy conservation, volume 2
[DOE/CS-40178/1-VOL-2] N81-14906

A report on the relevance of the second law of thermodynamics to energy conservation
[PB80-216914] N81-14913

NATIONAL CENTER FOR ATMOSPHERIC RESEARCH, BOULDER, COLO.

Doctor Fujita's microburst analysis at Chicago N81-14572

NATIONAL ENGINEERING LAB., EAST KILBRIDE (SCOTLAND).

Primary calibrations of critical flow venturi nozzles in high-pressure gas
[NEL-666] N81-14270

NATIONAL HURRICANE CENTER, CORAL GABLES, FLA.

Annual data and verification tabulation Atlantic tropical cyclones 1979
[PB80-226301] N81-14598

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, ANN ARBOR, MICH.

Computerized bathymetry and shorelines of the Great Lakes
[PB80-218308] N81-14387

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, BOULDER, COLO.

The microburst: Common factor in recent aircraft accidents N81-14571

A crosswind measurement module for the model 2 optical C sub n-2 instrument
[PB80-217607] N81-14600

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, ROCKVILLE, MD.

Alternative energy sources session ocean thermal energy conversion: Technology development
[PB80-218159] N81-14500

NATIONAL PHYSICAL LAB., LONDON (ENGLAND).

Ada compiler validation implementers' guide
[AD-A091760] N81-14660

NATIONAL PHYSICAL LAB., TEDDINGTON (ENGLAND).

An automatic method for checking the internal consistency of activity coefficients of binary mixtures
[NPL-CHEM-104] N81-14020

Vapor-liquid critical properties
[NPL-CHEM-107] N81-14021

The use of approximate expressions in power transmission spectrometry
[NPL-DES-64] N81-14024

Numerical solution of an advection-diffusion equation for a dissolved species in a pulsating crack
[NPL-DNACS-28/80] N81-14025

Spectroscopic investigations and determination of the temperature distribution in a metal halide discharge lamp
[NPL-QU-54] N81-14026

Errors associated with imperfect surfaces in standard hot-plate thermal conductivity measurements
[NPL-QU-57] N81-14170

The use of magnesium fluoride windows in an argon wall-stabilized mini-arc
[NPL-QU-58] N81-14171

Bibliography of fluid density: Experimental determinations on single substances over a temperature range exceeding 40 K
[NPL-CHEM-106] N81-14264

NPL-PTB intercomparison of iodine-stabilized ion lasers
[NPL-MOM-42] N81-14308

Monitoring pollutant gases from space using passive microwave techniques
[NPL-QU-59] N81-14505

Tables relating pure-tone audiometric threshold to age
[NPL-AC-94] N81-14616

A PASCAL processor validation suite
[NPL-CSU-7/80] N81-14654

Evaluation of the language Ada for use in numerical computations
[NPL-DNACS-30/80] N81-14655

A guide to the theory of gear's method for the numerical solution of systems of stiff ordinary differential equations
[NPL-DNACS-29/80] N81-14741

The rating of helicopter noise: Development of a proposed impulse correction
[NPL-AC-93] N81-14792

Realization of the ampere, and measurement of the gyromagnetic ratio of the proton
[NPL-DES-59] N81-14803

NATIONAL SEVERE STORMS LAB., NORMAN, OKLA.

Remote probing of wind and wind shears N81-14564

NATIONAL TECHNICAL INFORMATION SERVICE, SPRINGFIELD, VA.

Microwave landing systems. Citations from the Engineering Index data base
[PB80-814643] N81-13947

Microwave landing systems. Citations from the NTIS data base
[PB80-814635] N81-13948

Electrochemical methods of chemical analysis. Citations from the NTIS data base
[PB80-815053] N81-14057

High temperature lubricants and oils. Citations from the Engineering Index data base
[PB80-815590] N81-14096

High temperature lubricants and oils. Citations from the NTIS data base
[PB80-815582] N81-14097

High temperature lubricants and oils. Citations from the Engineering Index data base
[PB80-815574] N81-14098

Solid lubricants. Citations from the American Petroleum Institute data base
[PB80-816010] N81-14099

Solid lubricants. Citations from the NTIS data base
[PB80-815665] N81-14100

Solid lubricants: Graphite, polymers, fluorides, and general studies. Citations from the Engineering Index data base
[PB80-815673] N81-14101

Solid lubricants: Molybdenum compounds. Citations from the Engineering Index data base
[PB80-815681] N81-14102
Polycarboranes. Citations from the NTIS data base
[PB80-814163] N81-14136
Single sideband communications. Citations from the NTIS data base
[PB80-814262] N81-14209
Single sideband communications. Citations from the Engineering Index data base
[PB80-814270] N81-14210
Light communication systems. Citations from the NTIS data base
[PB80-815319] N81-14218
Computer aided design of microcircuits. Citations from the NTIS data base
[PB80-814296] N81-14258
Computer aided design of microcircuits. Citations from the Engineering Index data base
[PB80-814304] N81-14259
Computer networks. Citations from the NTIS data base
[PB80-814007] N81-14260
Superconducting magnets. Citations from NTIS data base
[PB80-816028] N81-14262
Numerical methods in fluid flow problems. Citations from the NTIS data base
[PB80-814171] N81-14285
Numerical methods in fluid flow problems. Citations from the NTIS data base
[PB80-814189] N81-14286
Hot film anemometry. Citations from the NTIS data base
[PB80-814288] N81-14297
Laser cutting and machining: Nonmetals. Citations from the Engineering Index data base
[PB80-814437] N81-14309
Laser cutting and machining: Metals Citations from the Engineering Index data base
[PB80-814445] N81-14310
Dye lasers. Citations from the NTIS data base
[PB80-813819] N81-14311
Dye lasers. Citations from the NTIS data base
[PB80-813801] N81-14312
Laser welding. Citations from the Engineering Index data base
[PB80-815202] N81-14335
Solar ponds. Citations from the Engineering Index data base
[PB80-814452] N81-14493
Solar ponds. Citations from the NTIS data base
[PB80-814460] N81-14494
Geothermal energy. Citations from the Engineering Index data base
[PB80-814692] N81-14495
Geothermal energy. Citations from the Engineering Index data base
[PB80-814684] N81-14496
Geothermal energy: Technology and general studies. Citations from the NTIS data base
[PB80-814676] N81-14497
Maneuvering aircraft: Noise pollution and control. Citations from the NTIS data base
[PB80-815566] N81-14525
Urban air pollution. Citations from the NTIS data base
[PB80-814411] N81-14526
Trends in computer technology. Citations from the NTIS data base
[PB80-815129] N81-14645
Applications of the Fast Fourier Transform. Citations from the NTIS data base
[PB80-815491] N81-14677
Computer networks. Citations from the NTIS data base
[PB80-814015] N81-14679
Control theory. Citations from the NTIS data base
[PB80-814395] N81-14689

NATIONAL WEATHER SERVICE, FORT WORTH, TEX.
An automated procedure for composition of severe weather watch areal redefining statements
[PB80-225584] N81-14595
Three-Hour rainfall required for flash flooding on small streams
[PB80-225576] N81-14596

NATIONAL WEATHER SERVICE, KANSAS CITY, MO.
A computer program for determining and displaying the geostrophic winds on Lakes Superior and Michigan
[PB80-225675] N81-14599

NATIONAL WEATHER SERVICE, SALT LAKE CITY, UTAH.
An automatic lightning detection system in northern California
[PB80-225592] N81-14597

NAVAL ACADEMY, ANNAPOLIS, MD.
Neutron radiation effects in fiber optics
[AD-A091661] N81-14838

NAVAL ENVIRONMENTAL PREDICTION RESEARCH FACILITY, MONTEREY, CALIF.
Determination of the primary specular point in the sunglint pattern of a polar-orbiting satellite image
[AD-A091664] N81-13989
Meteorological factors affecting evaporation duct height climatologies
[AD-A091665] N81-14583

NAVAL OCEAN SYSTEMS CENTER, SAN DIEGO, CALIF.
AEGIS Near-field antenna test system, automated test system for phased array antennas
[AD-A091697] N81-14199
Stragetic laser communications program. Volume 1: Proceedings of the Navy/DARPA Fourth Technical Interchange Meeting
[AD-A091619] N81-14201
Evaporation duct effects on maximum intercept range for 18-1 and 37.5-GHz emitters. A theoretical analysis of expected frequency distributions of intercept range for five oceanic areas
[AD-A091724] N81-14205
Surface based remote sensing in marine air. Extensive analysis of echoes by several sensors reveals evolutionary atmospheric processes related to weather capable of affecting naval operations
[AD-A091518] N81-14584

NAVAL RESEARCH LAB., WASHINGTON, D. C.
The broadening of spectral lines by autoionization, radiative transitions, and collisions
[AD-A091506] N81-14036
Comparison of the temperature-dependent elastic modulus of TiFe with H-doped TiFe in the (111) direction
[AD-A091507] N81-14065
Some error probabilities for the association of passive DF measurements with radar returns
[AD-A091659] N81-14206
Analysis of oscillations in the gyrotron traveling wave amplifier
[AD-A091586] N81-14246
Design of a high power 240 GHz gyromonotron
[AD-A091511] N81-14250
Magneto-optic materials for biasing ring laser gyros. Computer model evaluating scattering from multilayer dielectric thin film structures containing a magnetic layer
[AD-A091540] N81-14293
Experimental sea slicks in the Marsen (Maritme Remote Sensing) exercise
[AD-A091850] N81-14376
SEASAT altimeter atmospheric range correction
[AD-A091504] N81-14383
Long term variability of windspeed
[AD-A091802] N81-14581
Role of the sectionalized Fourier Transform in high-speed coherence processing
[AD-A091419] N81-14636

NAVAL SHIP RESEARCH AND DEVELOPMENT CENTER, BETHESDA, MD.
Generation of orthogonal boundary-fitted coordinate systems N81-14703
Application of the multigrid method to grid generation N81-14718

NAVAL TRAINING EQUIPMENT CENTER, ORLANDO, FLA.
Survey of CIG data base generation from imagery
[AD-A091508] N81-14923

NAVAL UNDERWATER SYSTEMS CENTER, NEW LONDON, CONN.
Approximations to the cumulative distribution function of the magnitude-squared coherence estimate
[AD-A091539] N81-14767

NAVAL WEAPONS CENTER, CHINA LAKE, CALIF.
An investigation of safety hazards and reliability problems in aerial refueling stores
[AD-A091788] N81-13938
Vanadium trineodecanoate promoter for fiberglass-polyester soil surfacings
[AD-A091785] N81-14084
Symmetrical combiner analysis with S parameter matrices and equivalent circuits
[AD-A091784] N81-14244
Automation of a maintainability prediction
[AD-A091787] N81-14339

NETWORK ANALYSIS CORP., VIENNA, VA.
Communications support for flight data entry and printout terminals
[AD-A091580] N81-14202
Distributed data processing standards forecast
[PB80-216211] N81-14642

NEW ENGLAND RESEARCH APPLICATION CENTER, STORRS, CONN.
Cryogenic aging of metals. Citations from the NTIS data base
[PB80-808868] N81-14075

NEW MEXICO INST. OF MINING AND TECHNOLOGY, SOCORRO.
Characterization of extrinsic grain boundary dislocations and grain boundary dislocation sources by transmission electron microscopy
[DOE/AL-10887] N81-14902

NEW MEXICO UNIV., ALBUQUERQUE.
Aircraft maintenance. Citations from the International Aerospace Abstracts data base
[PB80-815905] N81-13917
Inertial navigation and guidance. Citations from the International Aerospace Abstracts data base
[NASA-CR-163838] N81-13946
Technological forecasting--aircraft design. Citations from the International Aerospace data base
[PB80-815970] N81-13957
Horn antenna design studies. Citations from the International Aerospace Abstract data base
[NASA-CR-163820] N81-14219
Hydrogen fluoride and deuterium fluoride lasers. Citations from the International Aerospace Abstracts data base
[PB80-815871] N81-14313
Ultraviolet lasers. Citations from the International Aerospace Abstracts data base
[NASA-CR-163831] N81-14314
X-ray lasers. Citations from the International Aerospace Abstracts data base
[NASA-CR-163834] N81-14315
Neodymium YAG lasers. Citations from the International Aerospace Abstracts data base
[NASA-CR-163835] N81-14316
Remote sensing applied to pollution monitoring. Citations from the International Aerospace Abstracts data base
[NASA-CR-163830] N81-14388
Stress factors on pilot performance. Citations from the International Aerospace Abstracts data base
[NASA-CR-163836] N81-14623

NEW YORK UNIV., N. Y.
An adaptive computation mesh for the solution of singular perturbation problems N81-14701
A random choice finite-difference scheme for hyperbolic conservation laws
[DOE/ER-03077/167] N81-14908

NOBEL'S EXPLOSIVES CO. LTD., STEVENSTON (ENGLAND).
On the improvement of miniature pyrotechnic devices for space application
[ESA-CR(P)-1296] N81-14105
Codification of the high-temperature propellant TRHA
[ESA-CR(P)-1374-VOL-1] N81-14106

NORTH CAROLINA UNIV. AT CHAPEL HILL.
Research on atomic and molecular physics
[DOE/ER-06027/2] N81-14818

NORTHROP SERVICES, INC., HUNTSVILLE, ALA.
Site insolation and wind power characteristics
[DOE/CS-20160/01-VOL-1] N81-14546
Site insolation and wind power characteristics: Technical report Midwest region
[DOE/CS-20160-01-VOL-4] N81-14586
Site insolation and wind power characteristics: Technical report Western region (south section)
[DOE/CS-20160-01-VOL-6] N81-14587

Site insolation and wind power characteristics: Technical report Western region (north section)
[DOE/CS-20160/01-VOL-5] N81-14588
Site insolation of wind power characteristics: Southern region
[DOE/CS-20160/01-VOL-3] N81-14589

NORTHWESTERN UNIV., EVANSTON, ILL.
Bromine as a partial oxidant. Oxidation state and charge transport in brominated nickel and palladium bisdiphenylglyoximates: A comparison with the ionidated materials and resonance Raman structure spectra correlations for polybromides
[AD-A091534] N81-14037
Thermally stimulated discharge currents from sodium nitrate doped polyacrylonitrile
[AD-A091638] N81-14248
Elastodynamic analysis of an edge-crack normal to the free surface of a half-space N81-14342
Microscopic theory of dynamical correlations in the metallic electron liquid N81-14896
Strategies for control of lattice architecture in low-dimensional molecular metals: Assembly of partially oxidized face-to-face linked arrays of metallomacrocycles
[AD-A091535] N81-14900

NUCLEAR UTILITY SERVICES, INC., CLEARWATER, FLA.
Air/gas system dynamics of fossil fuel power plants. Volume 3: Experimental pressure test data of a 500 MW unit and of a 125 MW unit
[EPRI-CS-1444-VOL-3] N81-14478

O

OAK RIDGE NATIONAL LAB., TENN.
Helium-jet coupled mass separator: Advances and directions
[CONF-800870-1] N81-14047
Impurity studies in fusion devices using laser-fluorescence-spectroscopy
[CONF-801037-17] N81-14048
Parametric study of the stability margins of cable-in-conduit superconductors: Experiment
[CONF-800980-11] N81-14254
Ice-maker heat pump development
[ORNL/CON-50] N81-14282
An optical watthour meter digitizer
[ORNL/TM-7355] N81-14296
Summary of solar energy technology characterizations
[DOE/EV-0099] N81-14450
The environmental assessment of synfuels projects
[DOE/TIC-11286] N81-14512
Analytical model for a vertical buoyant jet
[ORNL/TM-7140] N81-14513
Systematic study of metal ion sorption on selected geologic media
[DOE/BETC/OR-14] N81-14545
RSTS/E communications link via an asynchronous multiplexer
[ORNL/CSD/TM-128] N81-14670
Application of mathematics and statistics to biometrics, materials science, safety, environmental sciences, and related topics
[ORNL/CSD-61] N81-14760
Evaluation of photon production data from neutron-induced reactions
[CONF-800979-1] N81-14819
Application of the shell model to nuclear spectroscopy
[DOE/TIC-11287] N81-14828
Experiments in the ISX-B Tokamak: ECRH ripple studies, pellet fueling, impurity flow reversal, and surface physics
[IAEA-CN-38/A-5] N81-14882
Instrumentation and controls of an ignited Tokamak
[ORNL/TM-7153] N81-14885
Equilibrium field coils for the Engineering Test Facility: Shaping the plasma cross section
[ORNL/TM-7339] N81-14886
Electron heating and confinement measurements in EBT-S using Thompson scattering
[ORNL/TM-7437] N81-14887
Currents induced in Tokamaks by electron cyclotron heating
[ORNL/TM-7503] N81-14888
Plasma Physics of Intense Neutral Beam heating in Tokamaks
[CONF-790463-2] N81-14890
Refinements to the Boolean approach to automatic data editing
[ORNL/TM-7156] N81-14925

OAK RIDGE Y-12 PLANT, TENN.
Electrochemical machining in-process data collection and control
[Y-2209] N81-14180

OAKLAND UNIV., ROCHESTER, MICH.
Design of fault-tolerant computers using ROM as basic building block
[AD-A091715] N81-14635

OFFICE NATIONAL D'ETUDES ET DE RECHERCHES AEROSPATIALES, LECLERC (FRANCE).
Review of theoretical and experimental results on three-dimensional turbulent wakes and boundary layers
[ONERA-NT-1980-4] N81-14268

OFFICE NATIONAL D'ETUDES ET DE RECHERCHES AEROSPATIALES, PARIS (FRANCE).
Review of theoretical and experimental results on three dimensional turbulent wakes and boundary layers
[ONERA-NT-1980-4] N81-13930

OGDEN AIR LOGISTICS CENTER, HILL AFB, UTAH.
Propellant surveillance report, LGM-30 F and G stage 1 phase G, series 1 TP-H1011
[AD-A091765] N81-14109
Stage 1 propellant, surveillance report glacial acrylic acid, motors GAA-001 and GAA-002, TP-H1011
[AD-A091707] N81-14110

OHIO STATE UNIV., COLUMBUS.
Development and optimization of methodologies for analysis of complex hydrocarbon mixtures
[DOE/ER-10554-T1] N81-14114
On the feasibility of quantitative ultrasonic determination of fracture toughness: A literature review
[NASA-CR-3356] N81-14337
Separability of center of mass and relative motion of hydrogen in very strong magnetic fields
[DOE/ER-01545/284] N81-14907

OHIO UNIV., ATHENS.
Study of structure of nuclei with neutrons and nuclear data measurement for MFE
[DOE/ER-02490/1] N81-14811

OREGON STATE UNIV., CORVALLIS.
Solar energy meteorological research and training site, region 5
[DOE/ET-20172] N81-14590
An objective method for determining the generalized transport tensor for two dimensional Eulerian models
[AD-A091732] N81-14756

P

PACIFIC-SIERRA RESEARCH CORP., SANTA MONICA, CALIF.
Improved noise suppression for multiband imagery
[AD-A091815] N81-14196

PCR, INC., GAINESVILLE, FLA.
Perfluoroalkyl polytriazines containing pendent iododifluoromethyl groups
[NASA-CASE-ARC-11241-1] N81-14016

PEDA CORP., PALO ALTO, CALIF.
Some aspects of adapting computational mesh to complex flow domains and structures with application to blown shock layer and base flow N81-14716

PENNSYLVANIA STATE UNIV., UNIVERSITY PARK.
Gasification of disordered carbons (chars)
[DOE/ER-10488-1] N81-14115
An axisymmetric, strong-interaction procedure to include large normal pressure gradients
[AD-A091820] N81-14274
Photovoltaic mechanisms in polycrystalline thin film solar cells
[DOE/ET-23106/2] N81-14441
Controlled cadmium telluride thin films for solar cells applications
[SERI/PR-9131-1-T1] N81-14482
Statistics of wind fluctuations over complex terrain
[DOE/ET-20560/1] N81-14593
Ultrasonic attenuation in normal and superconducting indium
[AD-A091605] N81-14797

PENNSYLVANIA UNIV., PHILADELPHIA.
Mechanisms of damage accumulation in time-dependent cyclic deformation
[DOE/ER-10570/1] N81-14363

PITTSBURGH AND MIDWAY COAL MINING CO., SHAWNEE MISSION, KANS.
Exploratory research on solvent refined coal liquefaction
[DOE/ET-14800/11] N81-14116
Exploratory research on solvent refined coal liquefaction
[DOE/ET-14800/13] N81-14117

PITTSBURGH UNIV., PA.
Hot corrosivity of coal gasification products on gas turbine alloys
[DOE/ET-13547/T1] N81-14070

PLESSEY CO. LTD., TOWCESTER (ENGLAND).
Evaluation and assessment of low noise preamplifiers for infrared detectors
[CD.6500671] N81-14837

POLYTECHNIC INST. OF NEW YORK.
Grid generation using classical techniques N81-14691

PRAKLA-SEISMOS G.M.B.H., HANNOVER (WEST GERMANY).
Direct detection of hydrocarbons using seismic procedures
[BMFT-FB-T-79-31] N81-14534

PRATT AND WHITNEY AIRCRAFT, WEST PALM BEACH, FLA.
Compressor configuration and design optimization for the high reliability gas turbine
[DOE/ET-15425/T1] N81-14327

PRATT AND WHITNEY AIRCRAFT GROUP, WEST PALM BEACH, FLA.
Improved capabilities to detect incipient bearing failures
[AD-A091687] N81-14325

PRINCETON UNIV., N. J.
The molybdenum-molybdenum triple bond. 9: Bis(1, 3-di-p-tolyltriazenido) olybdenum
[AD-A091550] N81-13997
Convective ignition of propellant cylinders in a developing cross-flow field
[AD-A091852] N81-14107
Disruptive shift of magnetic axis noncircular Tokamaks
[PPPL-1707] N81-14889

PURDUE UNIV., LAFAYETTE, IND.
Security assessment of power systems
[DOE/ET-29100/11] N81-14447
Random variate generation: A survey
[AD-A091343] N81-14774

Q

QUINBY (GILBERT F.), FORT WASHINGTON, PA.
An assessment of General Aviation utilization of advanced avionics technology
[NASA-CR-159328] N81-13941

R

RADIAN CORP., AUSTIN, TEX.
Trace metals and Stationary Conventional Combustion Processes. Volume 1: Technical report
[PB80-216161] N81-14519
Trace metals and Stationary Conventional Combustion Processes. Volume 2: Bibliography
[PB80-216179] N81-14520

RADIO CORP. OF AMERICA, BURLINGTON, MASS.
Manufacturing methods and technology program automatic in-process microcircuit evaluation
[AD-A091854] N81-14243

RADIO CORP. OF AMERICA, CAMDEN, N. J.
FETSIM user's manual and example
[NASA-CR-150800] N81-14222

RAND CORP., SANTA MONICA, CALIF.
Standard spacecraft procurement analysis: A case study in NASA-DoD coordination in space programs
[R-2619-RC] N81-14915

RANGE COMMANDERS COUNCIL, WHITE SANDS MISSILE RANGE, N. MEX.
Error sources applicable to precision trajectory radar calibration
[AD-A091654] N81-14204

RCA LABS., PRINCETON, N. J.
Photovoltaic mechnisms in polycrystalline thin-films silicon solar cells
[DOE/ET-23108/5] N81-14440
Photovoltaic mechanisms in polycrystalline thin-film silicon solar cells
[DOE/ET-23108/3] N81-14442

RENSSELAER POLYTECHNIC INST., TROY, N. Y.
On one-dimensional acceleration waves in composite materials modeled as interpenetrating solid continua
[AD-A091615] N81-14011
Heavy ion beam probing
[DOE/ET-53004/2] N81-14822

RESEARCH INST. OF NATIONAL DEFENCE, STOCKHOLM (SWEDEN).
Data obtained in radiowave propagation experiments on the path Kirunai Stockholm
[FOA-C-30187-E2] N81-14192
Earth resources
[FOA-C-10148-M3] N81-14375
Internal seismological stations for monitoring a comprehensive test ban theory
[FOA-C-20358-T1] N81-14535
Rapid calculation of sin(x)
[FOA-C-10150-M8] N81-14749
A general method of approximation particulary in L2
[FOA-C-10158-M8] N81-14750
Some notes on the gamma function
[FOA-C-10160-M8] N81-14751

RICE UNIV., HOUSTON, TEX.
TEBPP: Theoretical and Experimental study of Beam-Plasma-Physics N81-14952

RIVERSIDE RESEARCH INST., NEW YORK.
Metric accuracy analysis
[AD-A091749] N81-13982

ROCHESTER UNIV., N. Y.
Surface magnetic field/laser synergistic effects on the predissociation of adsorbed diatomic molecules
[AD-A091747] N81-14306
Biplot display multivariate matrices for inspection of data and diagnosis
[AD-A091821] N81-14659
High-energy positron ionization of adsorbed species in the impulse approximation
[AD-A091748] N81-14805

ROCKEFELLER UNIV., NEW YORK.
Diffractive photon dissociation on hydrogen (Fermilab Experiment 612)
[DOE/ER-02232/87] N81-14808

ROCKWELL INTERNATIONAL CORP., ANAHEIM, CALIF.
Bubble memory module
[NASA-CR-3380] N81-13993
Verification of selected solvent soluble coatings using production hybrid microcircuits
[AD-A091554] N81-14087

ROCKWELL INTERNATIONAL CORP., DOWNEY, CALIF.
Coaxial phased array antenna
[NASA-CASE-MSC-16800-1] N81-14187
Installing fiber insulation
[NASA-CASE-MSC-16973-1] N81-14317

ROCKWELL INTERNATIONAL CORP., GOLDEN, COLO.
Technical and management support for the development of small wind systems
[RFP-3126/3533/80/2] N81-14475
Technical and management support for the development of small wind systems: FY 1980 program summary
[RFP-3121/3533/80/8] N81-14476

ROCKWELL INTERNATIONAL CORP., THOUSAND OAKS, CALIF.
Growth of HgCdTe by modified molecular beam epitaxy
[AD-A091822] N81-14899

ROLLS-ROYCE LTD., DERBY (ENGLAND).
The compression moulding of composite aero engine components with elevated thermal stability
[PNR-90036] N81-13962
The future of civil turbo-fan engines
[PNR-90034] N81-13964
A resin injection technique for the fabrication of aero engine composite components
[PNR-90024] N81-14004
Hydroforming process for pressings
[PNR-90026] N81-14172
Electro-chemical polishing of cobalt in ethylene glycol and dimethyl formamide solutions of cobalt chloride
[PNR-90027] N81-14173
Hot flow turning T-A6V titanium alloy
[PUR-90028] N81-14174
The prediction of the flow and heat transfer in the vicinity of a jet in crossflow
[PNR-90025] N81-14271
Stress intensity factors for cracks with circular and elliptic crack fronts, determined by 3D finite element methods
[PNR-90035] N81-14349
Exhaust noise in flight: The role of acoustic installation effects
[PNR-90029] N81-14793
Ray theory to predict the propagation of broadband fan noise
[PNR-90030] N81-14794
The measurement of aero gas turbine noise
[PNR-90032] N81-14795

ROM-AIRE SOLAR CORP., AVON LAKE, OHIO.
Low cost bare-plate solar air collector
[DOE/R5-10143/T1] N81-14465

ROME AIR DEVELOPMENT CENTER, GRIFFISS AFB, N.Y.
The Federal Aviation Administration lightning protection modules designed for leadless devices
[AD-A091642] N81-13939

ROYAL AIRCRAFT ESTABLISHMENT, FARNBOROUGH (ENGLAND).
An analytical generator for drag-free satellite orbits
[RAE-TR-80085] N81-13981
Literature research on the mechanical properties of fibre composite materials. Analysis of the state of the art, volume 1
[RAE-LIB-TRANS-2045] N81-14003
An X-ray photoelectron spectroscopic examination of surfaces of some thermosetting resins and carbon fibre composites
[RAE-TM-MAT-347] N81-14007

ROYAL GREENWICH OBSERVATORY, HERSTMONCEUX (ENGLAND).
Photoheliographic results, 1972-1976
[ROG-13] N81-14941

ROYAL INST. OF TECH., STOCKHOLM (SWEDEN).
Statistical evaluation of J sub c in a 533-B weld metal and heat affected zone
[TRITA-HFL-0026] N81-14323
Fatigue threshold level in steel
[TRITA-HFL-0024] N81-14350
Studies of some algorithms for digital picture processing
[TRITA-NA-8003] N81-14656
A note on a differential system constructed by H. O. Kreiss
[TRITA-NA-8004] N81-14742
A note on Kronecker products and related norms
[TRITA-NA-8001] N81-14783
Linear mode conversion in a toroidal plasma
[TRITA-PFU-80-06] N81-14855
Critical ionization velocity effects in astrophysical plasmas
[TRITA-EPP-79-14] N81-14856
Some necessary parameters for a critical velocity interaction between the ionospheric plasma and a Xenon cloud
[TRITA-EPP-79-20] N81-14857
Electrostatic double layers and a plasma evacuation process
[TRITA-EPP-79-21] N81-14858
Rocket measurements of electric fields, electron density and temperature during the three phases of auroral substorms
[TRITA-EPP-79-22] N81-14859
Properties of a fluctuating double layer in a magnetized plasma column
[TRITA-EPP-80-02] N81-14860
Studies of electrostatic double layers with applications to cosmic plasmas
[TRITA-EPP-80-03] N81-14861
A proposed neutron spectrometer system for JET
[TRITA-80-02] N81-14862
On plasma equilibrium in a poloidal magnetic field
[TRITA-PFU-80-03] N81-14863
On the energy principle for plasma MHD stability in presence of an inhomogeneous magnetic vacuum field
[TRITA-PFU-80-04] N81-14864
The effects of radiating impurities and Boehm transport in a cool plasma mantle
[TRITA-PFU-80-05] N81-14865
Magnetoacoustic mode coupling to excitation structures
[TRITA-PFU-80-07] N81-14866
Experiment on magnetoacoustic mode excitation in FIVA device
[TRITA-PFU-80-08] N81-14867
Enhanced interaction of the solar wind and the interstellar neutral gas by virtue of a critical velocity effect
[TRITA-EPP-79-19] N81-14942

ROYAL NETHERLANDS METEOROLOGICAL INST., DE BILT.
Estimates of incoming shortwave radiation and net radiation from standard meteorological data
[KNMI-WR-80-6] N81-14189
Meteorological and oceanographic observations on board Netherlands light vessels and the light platform Goeree in the North Sea
[KNMI-141-27] N81-14370
Seismological bulletin of the seismograph stations in the Netherlands, volume 63, 1975
[KNMI-108-63] N81-14538
Some considerations about wind predictions over sea using a 'limited area model' based on primitive equations
[KNMI-V-349] N81-14577
Preliminary results on a comparison of shallow water wave predictions
[KNML-WR-80-5] N81-14602

S

SAN JOSE STATE UNIV., CALIF.
One-dimensional simulation of temperature and moisture in atmospheric and soil boundary layers
[NASA-CR-163841] N81-14531
Indometh acin-antihistamine combination for gastric ulceration control
[NASA-CASE-ARC-11118-2] N81-14613

SANDERS ASSOCIATES, INC., NASHUA, N. H.
High power laser and materials investigation
[DOE/DP-40054/1] N81-14307

SANDIA LABS., ALBUQUERQUE, N. MEX.
Thermal analysis of proposed W81 heatshield materials flown on a Malemute system
[SAND-79-2417] N81-14013
Isotope effect on hydrogen site energies for two metal dihydrides
[SAND-79-1541C] N81-14039
A theory of droplet combustion at high pressures
[SAND-80-0081] N81-14040
Electrothermal response testing of electroexplosive devices with electrically conducting explosives
[SAND-80-0231] N81-14112
Analytic solutions for thermal conduction from heat producing cylinders and spheres
[SAND-80-0039] N81-14277
Film transporting curved crystal X-ray spectrometer
[SAND-80-1286] N81-14294
Ultrasonic measurement of elastic moduli of 17-4 PH stainless steel and uranium - 2 molybdenum from minus 40 deg C to 800 deg C
[SAND-80-1121] N81-14355
Elastic moduli of boron carbide/copper composites from minus 40 deg C to 800 deg C by ultrasonic methods
[SAND-80-0881] N81-14356
Annular solar receiver thermal characteristics
[SAND-79-1010] N81-14410
Development of sheet molding compound solar collectors with molded-in silvered glass reflective surfaces
[SAND-80-0702C] N81-14411
Solar mirror materials: Their properties and uses in solar concentrating collectors
[SAND-79-2190] N81-14412
Electrochemical and surface analysis of the reactive interfaces in the Li (Si)/FeS2 primary battery
[SAND-79-2155] N81-14413
Solar central receiver in perspective
[SAND-79-2154C] N81-14414
The effect of soiling on solar mirrors and techniques used to maintain high reflectivity
[SAND-79-2422] N81-14415

Regional conceptual design and analysis studies for residential photovoltaic systems, volume 2
[SAND-78-7040/2] N81-14416

Torque ripple in a Darrieus, vertical axis wind turbine
[SAND-80-0475] N81-14417

DOE/DOD environmental data bank index
[SAND-79-2130] N81-14506

A two-stage nonrecursive filter/decimator
[SAND-80-0891] N81-14639

A versatile microcomputer-based temperature controller
[SAND-79-2313] N81-14640

An overview of a minicomputer network
[SAND-80-0821] N81-14678

Generations of orthogonal surface coordinates
N81-14700

The weighted linear least squares problem: An interval analysis approach to rank determination
[SAND-80-1260] N81-14757

An interval analysis approach to rank determination in linear least squares problems
[SAND-80-0655] N81-14758

Electron paramagnetic resonance of material properties and processes
[SAND-80-1230C] N81-14807

Snow: A digital computer program for the simulation of ion beam devices
[SAND-79-1027] N81-14823

Electrochemical and surface analysis of the reactive interfaces in the li(si)feS2 primary battery
[SAND-79-2155C] N81-14901

The strategy for assessing the technical, environmental, and engineering feasibility of subseabed disposal
[SAND-79-2245] N81-14927

The case against electric vehicles is running out of gas
[SAND-79-1770] N81-14928

SANTA CLARA UNIV., CALIF.

Advanced automation for space missions: Technical summary
[NASA-CR-163827] N81-14914

SAVANNAH RIVER ECOLOGY LAB., AIKEN, S. C.

Automated emergency meteorological response system
[DP-MS-80-81] N81-14592

Long-term high-level waste technology
[DOE/SR/WM-79/2] N81-14827

SCHOOL OF AEROSPACE MEDICINE, BROOKS AFB, TEX.

Organic compounds in the exhaust of a J85-5 turbine engine
[AD-A091712] N81-13966

Test and evaluation of an Energetics Science Incorporated Model 7660 electrochemical hydrazines analyzer
[AD-A091710] N81-14035

Crew stress and fatigue in the PAVE
[AD-A091668] N81-14620

A class of sequential input adaptive systems
[AD-A091655] N81-14687

SCIENCE APPLICATIONS, INC., CANOGA PARK, CALIF.

Efficient utilization of alternate fuels: Development of models for the prediction of interchangeability, design, and performance of gas burner/combustor systems
[PB80-218282] N81-14134

SCIENCE APPLICATIONS, INC., MCLEAN, VA.

A three-dimensional body-fitted coordinate system for flow field calculations on asymmetric nosetips
N81-14711

Requirements for an historical stratification file using STD and CTD data
[AD-A091864] N81-14921

Specifications for an STD/CTD system at the NODC
[AD-A091866] N81-14922

SCIENCE APPLICATIONS, INC., MONTEREY, CALIF.

The Eastern Pacific Tropical Cyclone Strike Probability Program (EPSTRKP)
[AD-A091841] N81-14579

SEMIKRON GESELLSCHAFT FUER GLEICHRICHTERBAU UND ELEKTRONIK M.B.H., NUREMBERG (WEST GERMANY).

Novel production method for high-voltage semiconductor devices with greatest possible economy
[BMFT-FT-T-79-126] N81-14236

SERENDIPITY, INC., SHERMAN OAKS, CALIF.

An analysis of the characteristics of Rayleigh waves produced by surface explosions
[AD-A091806] N81-14207

SEVILLE RESEARCH CORP., PENSACOLA, FLA.

Human factors problems in general aviation
[AD-A091670] N81-14625

SHEFFIELD UNIV. (ENGLAND).

A review of control theory for digital systems
[RR-120] N81-14685

On the geometry of multivariable root-loci
[RR-118] N81-14748

Analysis of estimation errors in the identification of nonlinear systems
[RR-115] N81-14776

Identification of nonlinear systems using parameter estimation techniques
[RR-117] N81-14779

SIEMENS A.G., ERLANGEN (WEST GERMANY).

Electrochromic displays
[BMFT-FB-T-79-108] N81-14234

Supplementary investigations to fundamental research program plasma techniques
[BMFT-FB-T-79-43] N81-14854

SIEMENS A.G., MUNICH (WEST GERMANY).

Physical and chemical processes for the generation of 1 micron structures
[BMFT-FB-T-79-51] N81-14023

Planar transistors and impatt diodes with ion implantation
[BMFT-FB-T-79-16] N81-14224

Large-scale integrated MOS circuits with small dimensions. Preparation of thin films
[BMFT-FB-T-79-55] N81-14226

Integrated RC-circuits in ALTA-technology on one substrate
[BMFT-FB-T-79-107] N81-14227

Integrated circuits for remote command and data transmission
[BMFT-FB-T-79-50] N81-14230

Basic concepts for integrated RC networks and hybrid circuits on organic substrate foils
[BMFT-FB-T-79-87] N81-14231

Large scale integrated MOS-circuits with narrow structures: Artworks and masks
[BMFT-FB-T-79-104] N81-14233

Medium power silicon transistors
[BMFT-FB-T-79-160] N81-14237

Monolithically integrated circuits on GaAs
[BMFT-FB-T-79-176] N81-14239

Bipolar microprocessor circuits
[BMFT-FB-T-79] N81-14633

Electron energy loss spectrometry
[BMFT-FB-T-79-181] N81-14802

Multiplex operation with passive displays
[BMFT-FB-T-80-017] N81-14835

Homogeneous phosphorus of silicon by neutron transmutation
[BMFT-FB-T-79-52] N81-14898

SIGNATRON, INC., LEXINGTON, MASS.

Adaptive Antenna Control (AAC) program
[AD-A091764] N81-14197

SOFTECH, INC., WALTHAM, MASS.

Ada compiler validation implementers' guide
[AD-A091760] N81-14660

SOLAR TURBINES INTERNATIONAL, SAN DIEGO, CALIF.

Joining of ceramics for high performance energy systems
[DOE/ET-15359/1] N81-14092

SOUTHAMPTON UNIV. (ENGLAND).

Measurements of fluctuating density and temperature in an axisymmetric flame
[AASU-342] N81-14028

Static and dynamic response of an aluminum alloy panel having a central opening with combined in-plane biaxial static loading and acoustic excitation
[ISVR-TR-103] N81-14353

Activities of the Institute of Sound and Vibration Research for the year ending March 1980
N81-14960

SOUTHERN CALIFORNIA ASSOCIATION OF GOVERNMENTS, LOS ANGELES

Southern California aviation system study
[PB80-215544] N81-13916

SOUTHERN METHODIST UNIV., DALLAS, TEX.

Thin film cadmium telluride solar cells
[DOE/ET-23009/T10] N81-14438

Thin film cadmium telluride solar cells
[DOE/ET-23009/T11] N81-14446

Minimum distance estimation and components of goodness of fit statistics
[AD-A091514] N81-14769

Biased regression: A ten year perspective
[AD-A091551] N81-14770

The determination of seasonal ARMA models
[AD-A091516] N81-14784

Modeling seasonal ARMA processes
[AD-A091515] N81-14785

SOUTHWEST RESEARCH INST., SAN ANTONIO, TEX.

Reduction of exhaust smoke from gas-turbine engines by using fuel emulsions
[AD-A091777] N81-13953

The study and modeling of high temperature fatigue crack propagation in austenitic stainless steel
[DOE/ER-10475/T1] N81-14067

SPAR AEROSPACE PRODUCTS LTD., TORONTO (ONTARIO).

Shuttle remote manipulator system hardware test facility N81-14146

The role of the real-time simulation facility, SIMFAC, in the design, development and performance verification of the Shuttle Remote Manipulator System (SRMS) with man-in-the-loop N81-14147

SPECTRON DEVELOPMENT LABS., INC., COSTA MESA, CALIF.

Experimental and analytical development of the application of a transit laser velocimeter
[AD-A091762] N81-14302

SRI INTERNATIONAL CORP., MENLO PARK, CALIF.

Lidar observations at 0.7-micrometers and 10.6 micrometers wavelengths during smoke week 2
[AD-A091561] N81-14382

Application of microfabrication technology to thermionic energy conversion
[DOE/ET-15423/4] N81-14431

Development of an airborne lidar for characterizing particle distribution in the atmosphere
[EPRI-EA-1538] N81-14514

Generation of boundary and boundary-layer fitting grids N81-14694

STANFORD UNIV., CALIF.

Use of amplitude compandored SSB in the mobile radio bands
[PB80-215759] N81-14211

Use of amplitude compandored SSB in the mobile radio bands
[PB80-215791] N81-14212

Convenience circuits
[PB80-215783] N81-14213

Analysis, design, and performance evaluation of a single channel ACSB system
[PB80-215775] N81-14214

Spectral efficiency of FM and ACSB radios
[PB80-215767] N81-14215

Misspecification of trend in spatial random function interpolation with application to oxidant mapping
[DOE/EV-02874/59] N81-14517

Problematic features of programming languages: A situational-calculus approach. Part 1: Assignment statements
[AD-A091639] N81-14665

Grid generation for time dependent problems: Criteria and methods N81-14699

Adiabatic and non-adiabatic processes in thermal models of solar hard X-ray bursts
[NASA-CR-163839] N81-14943

STEVENS INST. OF TECH., HOBOKEN, N. J.

Free-stream disturbances, continuous eigenfunctions, boundary-layer instability and transition
[NASA-CR-163828] N81-14266

STICHTING MATHEMATISCH CENTRUM, AMSTERDAM (NETHERLANDS).

Nerve impulse propagation in a branching nerve system: A simple model
[MC-TW-203/80] N81-14617

Bitonic sort on ultracomputers
[MC-IW-117/79] N81-14626

Recurrent ultracomputers are not log n-fast
[MC-IW-118/79] N81-14627

Abstracto 84: The next generation
[MC-IW-120/79] N81-14628

The revised Al GOL 68 test set
[MC-IW-122/79] N81-14629

How inefficient are stack-oriented abstract machines?
[MC-IW-123/79] N81-14630

A comparitive analysis of the Intel 8086, the Zilog Z8000 and the Motorola MC68000 microprocessors
[MC-IW-129/80] N81-14631
A characterization of computable data types by means of a finite, equational specification method
[MC-IW-124/79] N81-14649
Exception handling with multiexit statements
[MC-IW-125/79] N81-14650
An overview of the summer programming language
[MC-IW-126/79] N81-14651
Equational specifications for computable data types: Six hidden functions suffice and other sufficiency bounds
[MC-IW-128/80] N81-14652
Computing in algebraic systems
[MC-IW-130/80] N81-14653
A survey of high level microprogramming languages
[MC-IW-138/80] N81-14657
Time and space complexity of inside-out macro languages
[MC-IW-141/80] N81-14658
Duality in polynomial models with some applications to geometric control theory
[MC-BW-115/79] N81-14682
On a class of nearly singular optimal control problems
[MC-TW-196/80] N81-14683
On a class of optimal control problems with an almost cost free solution
[MC-TW-204/80] N81-14684
A recursive approach to the implementation of enumerative methods
[MC-BW-116/80] N81-14728
Computing the perimeter of a set of rectangles
[MC-IW-121/79] N81-14729
A note on C(O) Galerkin methods for two point boundary problems
[MC-NW-73/79] N81-14730
On the economization of stabilized Runge-Kutta methods with applications to parabolic initial value problems
[MC-NW-74/79] N81-14731
Multiple grid methods for the solution of Fredholm integral equations of the second kind
[MC-NW-75/79] N81-14732
Linear multistep methods and the construction of quadrature formulae for Volterra integral and integro-differential equations
[MC-NW-76/79] N81-14733
On a class of explicit three-step Runge-Kutta methods with extended real stability intervals
[MC-NW-77/79] N81-14734
Modified Nystroem methods for semi-discrete hyperbolic differential equations
[MC-NW-78/80] N81-14735
A study of the representations of SL(2,C) using noninfinitesimal methods
[MC-TW-190/79] N81-14736
On the expansion of confluent hypergeometric functions in terms of Bessel functions
[MC-TW-192/79] N81-14737
A precise definition of separation of variables
[MC-TW-194/79] N81-14738
How many jumps? Variational characterization of the limit solution of a singular perturbation problem
[MC-TW-195/79] N81-14739
Volterra integral equations and semigroups of operators
[MC-TW-197/80] N81-14740
Superconvergence in collocation and implicit Runge-Katta methods for Volterra-type integral equations of the second kind
[MC-NW-80/80] N81-14743
On V sub o stability of numerical methods for Volterra integral equations of the second kind
[MC-NW-84/80] N81-14744
Numerical solution of two coupled nonlinear equations related to the limits of Buchstab's iteration sieve
[MC-NW-86/80] N81-14745
Hyperperfect numbers with more than two different prime factors
[MC-NW-87/80] N81-14746
The numerical computation of the confluent hypergeometric function U(a, b, z)
[MC-TW-202/80] N81-14747
Clines in a discrete time model in population genetics
[MC-TW-193/79] N81-14762
Branching processes with continuous state space allowing immigration
[MC-SW-67/80] N81-14763
Behadur efficiency and small-sample efficiency: A numerical study
[MC-SW-68/80] N81-14764
Linear programming and undiscounted stochastic games in which one player controls transitions
[MC-BW-122/80] N81-14777
Duality and the nonlinear roundtrip alpha center and covering problems on a tree
[MC-BW-123/80] N81-14778
Hierarchial distribution modeling with routing costs
[MC-BW-117/80] N81-14780
Analytical evaluation of hierarchial planning systems
[MC-BW-118/80] N81-14781

STOCKHOLM UNIV. (SWEDEN).
Air chemistry measurements in the lower atmosphere over Sweden: Data evaluation
[AC-45] N81-14533

STUTTGART UNIV. (WEST GERMANY).
Design study for the JET diagnostic systems Quasi-Continuous Laser Scattering
[IPF-80-2] N81-14298
Time resolved Thomson scattering using a periodically emitting ruby laser
[IPF-80-4] N81-14299
Non-axisymmetric (m=plus or minus 1) Alfven waves in a cylindrical plasma
[IPF-80-1] N81-14851
Forced and free magnetoacoustic oscillations of toroidal argon plasmas
[IPF-8-3] N81-14852
Wave propagation in a deuterium-hydrogen-oxygen plasma in the range of ion cyclotron frequencies
[IPF-80-5] N81-14853

SWEDLOW, INC., GARDEN GROVE, CALIF.
Manufacturing Methods and Technology (MM/T) project to establish production techniques to manufacture rigid armor for radar antenna hardening
[AD-A091863] N81-14203

SYDNEY UNIV. (AUSTRALIA).
Determination of soil properties from field observations of settlement
[PB80-213226] N81-14181

SYNERGIC RESOURCES CORP., BALA-CYNWYD, PA.
Industrial cogeneration case studies
[EPRI-EM-1531] N81-14467

SYRACUSE UNIV., N. Y.
Performance degradation of a 7400 TTL NAND gate due to sinusoidal interference
[AD-A091745] N81-14249

SYSTEM PLANNING CORP., ARLINGTON, VA.
A survey of simulation and test results for assessing RPV performance in a WBIC environment
[AD-A091603] N81-13954

SYSTEMS APPLICATIONS, INC., SAN RAFAEL, CALIF.
Assessment of the visibility impairment caused by the emissions from the proposed power plant at Boron, California
[NASA-CR-163103] N81-14504

SYSTEMS CONTROL, INC., PALO ALTO, CALIF.
Satellite Power System: Utility impact study
[EPRI-AP-1548] N81-14470

SYSTEMS RESEARCH LABS., INC., DAYTON, OHIO.
The stress behavior of three advanced nickel base superalloys during high temperature low cycle fatigue
[AD-A091694] N81-14061

T

TECHNISCHE HOCHSCHULE, AACHEN (WEST GERMANY).
Two well storage systems for combined heating and airconditioning by groundwater heatpumps in shallow aquifers
[LBI-11302] N81-14472

TECHNISCHE HOGESCHOOL, DELFT (NETHERLANDS).
Fundamentals of conceptual design optimization of subsonic transport aircraft
[VTH-LR-292] N81-13951
Agglomeration in suspension: A study of mechanisms and kinetics
[WTHD-120] N81-14027
Derivation of the solid propellant response function
[VTH-M-366] N81-14104
Digital data reduction algorithm for oscillatory signals with an application to L-instability
[VTH-LR-298] N81-14194
Graphs of the three-dimensional state of stress at the vertex of a quarter-infinite crack in a half-space
[NTHD-123] N81-14351
Refined theory for bending of perforated plates
[WTHD-125] N81-14352
Estimation on the Wettzell coordinates from satellite laser ranging at Kootwijk, San Fernando and Wettzell
[VTH-LR-296] N81-14373

TECHNOLOGY, INC., HOUSTON, TEX.
Metabolic rate measurement system
[NASA-CR-160893] N81-14614

TECHNOLOGY SERVICE CORP., SANTA MONICA, CALIF.
Visibility in California
[PB80-216765] N81-14518

TELEDYNE CONTINENTAL MOTORS, MOBILE, ALA.
Advanced Technology Spark-Ignition Aircraft Piston Engine Design Study
[NASA-CR-165162] N81-13963

TENNESSEE UNIV., KNOXVILLE.
Air Force runoff model (AFRUM) user manual documentation
[AD-A091717] N81-14380
Satellite Power System (SPS) antenna pointing control
[NASA-CR-3350] N81-14392
An energy and cost analysis of residential heat pumps in northern climates
[DOE/TIC-11275] N81-14462
Grid and metric generation on the assembly of locally bi-quadratic coordinate transformations N81-14698

TENNESSEE UNIV. SPACE INST., TULLAHOMA.
MHD coal-fired flow facility
[DOE/ET-10815/47] N81-14433
Proceedings: Fourth Annual Workshop on Meteorological and Environmental Inputs to Aviation systems
[NASA-CP-2139] N81-14555

TEXAS A&M UNIV., COLLEGE STATION.
A survey of concepts/techniques for sensing oxygen in aircraft oxygen-generating systems
[AD-A091667] N81-14038
Polymer activated catalysts
[AD-A091750] N81-14085
Modifications to the Hess three-dimensional lifting body code to convert from CDC FORTRAN to IBM FORTRAN with reductions in core requirements and execution times N81-14647
Minimum distance estimation and components of goodness of fit statistics
[AD-A091514] N81-14769

TEXAS UNIV., AUSTIN.
Ion dynamics and the unified tearing mode
[DOE/ET-53036/23] N81-14817
Tokamak currents driven by weak electrostatic waves
[DOE/ET-53036/18] N81-14880

TEXAS UNIV., EL PASO.
Extended applicability of optical wind sensing techniques
[AD-A091606] N81-14582

TEXAS UNIV. AT ARLINGTON.
Solar photovoltaic/thermal residential experiment, phase 1
[DOE/ET-20279/103] N81-14437

TEXAS UNIV. AT AUSTIN.
The effects of warhead-induced damage on the aeroelastic characteristics of lifting surfaces. Volume 1: Aeroelastic effects
[AD-A091674] N81-13955
Digital Data Recording System (DDRS) operating and maintenance manual
[NASA-CR-160894] N81-14288
On the performance of a modified sign detector for M-dependent data
[AD-A091570] N81-14771
Thermodynamic interpretation of multiparticle emission in relativistic heavy ion collisions
[DOE/ER-03992/388] N81-14812

A note on Zeno's paradox in quantom theory
[DOE/ER-03992/387] N81-14909
Network flow optimization for water resources planning with uncertainties in supply and demand
[PB80-221161] N81-14934

TRANSPORTATION RESEARCH BOARD, WASHINGTON, D.C.
Sealing joints and cracks, thin resurfacing, and locating voids under concrete slabs
[PB80-215635] N81-14182

TRW DEFENSE AND SPACE SYSTEMS GROUP, REDONDO BEACH, CALIF.
Monte Carlo simulation of negative ion collection by a rocket borne mass spectrometer
[AD-A091721] N81-14542
Formal SEMANOL specification of Ada
[AD-A091682] N81-14666
Waves In Space Plasmas (WISP)
[WISP-336] N81-14953

TULSA UNIV., OKLA.
Evaluation of orifice meter recorder measurement errors in lower and upper capacity ranges
[DOE/BC-10025/18] N81-14295

U

UNION COLL., SCHENECTADY, N.Y.
General results, time series in M dimensions
[AD-A091578] N81-14766
Some simple examples of time series in M dimensions: An introduction
[AD-A091733] N81-14772
Time series in m dimensions: Spatial models
[AD-A091734] N81-14773

UNITED AIRCRAFT CORP., SUNNYVALE, CALIF.
Method and tool for machining a transverse slot about a bore
[NASA-CASE-LAR-11855-1] N81-14319

UNITED ENGINEERS AND CONSTRUCTORS, INC., PHILADELPHIA, PA.
District heating/cogeneration application studies for Minneapolis-St. Paul area. Modifications of the existing units at the High Bridge Power Plant to cogeneration for hot water district heating
[ORNL/TM-6830/P9] N81-14474

UNITED KINGDOM ATOMIC ENERGY AUTHORITY, CULHAM (ENGLAND).
Field emission electric propulsion ion optics of slit emitters and beam focussing
[CLM/RR/E1/28] N81-14836

UNITED MERCHANTS RESEARCH CENTER, LANGLEY, S.C.
Application of foams to the processing of fabrics, phase 3
[DOE/CS-40056/T2] N81-14093

UNITED TECHNOLOGIES CORP., EAST HARTFORD, CONN.
A new coordinate transformation for turbulent boundary layer flows N81-14702

UNITED TECHNOLOGIES CORP., SOUTH WINDSOR, CONN.
Compressor configuration and design optimization for the high reliability gas turbine
[DOE/ET-15425/T1] N81-14327
Development of molten carbonate fuel cell power plant technology
[DOE/ET-15440/2] N81-14432

UNITED TECHNOLOGIES RESEARCH CENTER, EAST HARTFORD, CONN.
Plasma stabilization experiment
[DOE/ET-53087/2] N81-14876

UNIVERSITY OF EASTERN ILLINOIS, CHARLESTON.
Nonlinear grid error effects on numerical solution of partial differential equations N81-14704

UNIVERSITY OF SOUTHERN MISSISSIPPI, HATTIESBURG.
Improved polymers for enhanced oil recovery synthesis and rheology
[DOE/BETC-5603/10] N81-14089

UNIVERSITY OF WESTERN ILLINOIS, MACOMB.
Some simple examples of time series in M dimensions: An introduction
[AD-A091733] N81-14772

UTAH STATE UNIV., LOGAN.
Trace constituents in the middle atmosphere by high resolution UV spectroscopy N81-14947

UTAH UNIV., SALT LAKE CITY.
Study of combustion and flame processes initiated by IR laser-induced absorption
[COO-4695-4] N81-14049
Interpretation of dipole-dipole electrical resistivity survey, Colado geothermal area, Pershing County, Nevada
[DOE/ID-12079/11] N81-14252

V

VACUUMSCHMELZE G.M.B.H., HANAU (WEST GERMANY).
Development of soft magnetic materials with special properties
[BMFT-FB-T-79-32] N81-13996

VDI-TECHNOLOGIEZENTRUM, BERLIN (WEST GERMANY).
Documentation of and information on protective rights relating to government support on 'technological research and development
[BMFT-FB-T-79-186] N81-14918

VIRGINIA POLYTECHNIC INST., BLACKSBURG.
The effects of shear and roughness on vortex shedding patterns behind a circular cylinder at critical Reynolds numbers
[DOE/NOAA/OTEC-1] N81-14284

VIRGINIA STATE UNIV., PETERSBURG.
Muon spin rotation research program
[NASA-CR-163829] N81-14801

VIRGINIA UNIV., CHARLOTTESVILLE.
Coastal zone wind energy. Part 1: Synoptic and mesoscale controls and distributions of coastal wind energy
[DOE/ET-20274/7-PT-1] N81-14434

W

WASHINGTON SCIENTIFIC MARKETING, INC., WASHINGTON, D.C.
Proceedings of the Depeartment of Energy Advanced Gas Turbine Central Power Systems Workshop
[CONF-8004103] N81-14479

WASHINGTON UNIV., SEATTLE.
Grid generation using coarse, smooth finite elements N81-14705
Production of optically thin free-standing oil films from the edge of a rotating disc
[DOE/ER-01388/457] N81-14840

WASHINGTON UNIV., ST. LOUIS, MO.
J-integral elastic plastic fracture mechanics evaluation of the stability of cracks in nuclear reactor pressure vessels
[SAND-80-0688] N81-14357
Investigation of nuclear structure and nuclear reactions induced by complex projectiles
[DOE/ER-04052/T1] N81-14826

WATERLOO UNIV. (ONTARIO).
A two dimensional mesh verification algorithm N81-14720

WEAPONS SYSTEMS RESEARCH LAB., ADELAIDE (AUSTRALIA).
Low-speed wind-tunnel tests of two weathercocking sensors
[WSRL-0171-TM] N81-14575

WESTINGHOUSE ELECTRIC CORP., PITTSBURGH, PA.
Ceramic turbine components research and development. Part 2: Evaluation of MCrAlY/ZrO2 (Y2O3) thermal-barrier coatings exposed to simulated gas turbine environments
[EPRI-AP-1539-PT-2] N81-14331
Photovoltaic mechanisms in polycrystalline thin film solar cells
[DOE/ET-23106/2] N81-14441
Air/gas system dynamics of fossil fuel power plants. Volume 3: Experimental pressure test data of a 500 MW unit and of a 125 MW unit
[EPRI-CS-1444-VOL-3] N81-14478
An experimental study of unipolar arcs in a low pressure mercury discharge
[DOE/ET-51010/8] N81-14871
Research, development, and demonstration of nickel iron batteries for electric vehicle propulsion
[ANL/OEPM-79-14] N81-14932

WESTINGHOUSE ELECTRIC CORP., RED BANK, N.J.
Study to optimize Cr-Mo steels to resist hydrogen and temper embrittlement
[DOE/ET-13513/T1] N81-14068
MHD electrode development
[DOE/ET-15529/T1] N81-14875

WESTINGHOUSE RESEARCH LABS., PITTSBURGH, PA.
Regional conceptual design and analysis studies for residential photovoltaic systems, volume 2
[SAND-78-7040/2] N81-14416

WHARTON (E. F. A.), INC., PHILADELPHIA, PA.
The flat-file alerter system
[AD-A091842] N81-14920

WISCONSIN UNIV. - MADISON.
Troposcatter antenna positioner
[AD-A091778] N81-14198
Studies in objective forecasting of mesoscale weather using an interactive computer system
[AD-A091752] N81-14580
Observations of neoclassical and anomalous resistivity in toroidal discharges
[DOE/ET-53051/4] N81-14879
Fusion reactor physics and technology
[DOE/ET-52048/T1] N81-14881
Stability analysis of cylindrical Vlasov equilibria
[DOE/ET-53051/113] N81-14895

WISCONSIN UNIV. - MILWAUKEE.
Determination of atmospheric phosphorous addition to Lake Michigan
[PB80-219124] N81-14385
Synthesis of research and development in mechanical energy storage technologies
[DOE/ET-16106/T1] N81-14439

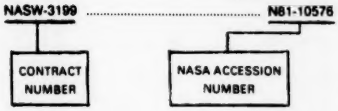
WOODS HOLE OCEANOGRAPHIC INSTITUTION, MASS.
Applications of time series analysis to geophysical data
[PB80-213978] N81-14551
Bioengineering aspects of inorganic carbon supply to mass algal cultures
[DOE/ET-20604/1] N81-14608

Y

YALE UNIV., NEW HAVEN, CONN.
Experimental studies of electron impact depopulation of excited states of atoms: Applications to laser development for fusion and isotope separation
[DOE/ES-04199/1] N81-14816

YORK UNIV., TORONTO (ONTARIO).
Wide angle Michelson Doppler imaging interferometer N81-14949

Typical Contract Number Index Listing



Listings in this index are arranged alpha-numerically by contract number. Under each contract number the NASA accession numbers denoting documents that have been produced as a result of research done under that contract are arranged in ascending order. The NASA accession number denotes the number by which the citation is identified.

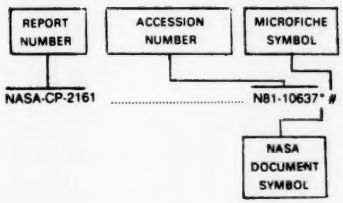
AF PROJ. 1900 ..... N81-14380
AF PROJ. 2301 ..... N81-13955
AF PROJ. 2304 ..... N81-14196
N81-14635
N81-14686
N81-14688
N81-14753
N81-14754
N81-14755
N81-14771
N81-14786
AF PROJ. 2306 ..... N81-14009
AF PROJ. 2310 ..... N81-13986
N81-14540
N81-14542
AF PROJ. 2312 ..... N81-14687
AF PROJ. 2338 ..... N81-14200
AF PROJ. 2402 ..... N81-13940
AF PROJ. 2403 ..... N81-13976
N81-14326
AF PROJ. 2787 ..... N81-14038
AF PROJ. 3048 ..... N81-14325
AF PROJ. 3058 ..... N81-13995
AF PROJ. 3066 ..... N81-14276
AF PROJ. 3221 ..... N81-14247
AF PROJ. 4519 ..... N81-14198
AF PROJ. 6670 ..... N81-14580
AF PROJ. 6687 ..... N81-14543
AF PROJ. 7351 ..... N81-14061
AF PROJ. 7930 ..... N81-13966
N81-14032
N81-14035
N81-14620
AF PROJ. 8809 ..... N81-14305
AF PROJ. 9567 ..... N81-13939
AF PROJ. 9996 ..... N81-13978
AF-AFOSR-0005-79 ..... N81-14698
AF-AFOSR-0185-80 ..... N81-14726
AF-AFOSR-2854-75 ..... N81-14754
AF-AFOSR-2922-76 ..... N81-14726
AF-AFOSR-3062-76 ..... N81-14771
AF-AFOSR-3092-76 ..... N81-14686
N81-14753
AF-AFOSR-3271-77 ..... N81-14664
N81-14688
AF-AFOSR-3391-77 ..... N81-14009
AF-AFOSR-3569-78 ..... N81-13955
AFOSR MIPR-HM0050-651 ..... N81-14383
AFOSR MIPR-1456-79 ..... N81-14010
ARB-A7-149-30 ..... N81-14523
ARB-A7-181-30 ..... N81-14518
ARPA ORDER 512 ..... N81-14924
ARPA ORDER 3074 ..... N81-14636
ARPA ORDER 3704 ..... N81-14899
AT/2040/084 ..... N81-14028
B-GI-402 ..... N81-14298
BMFT-TV-77230 ..... N81-14791
CNR/CISE-78-00901.02 ..... N81-14083
CNR/CISE-78-01902.98 ..... N81-14301
CNR/RTM-78-01897.98 ..... N81-14301
DA PROJ. 1K4-63730-D-560 ..... N81-14663
DA PROJ. 1L1-61102-AH-42 ..... N81-14062
DA PROJ. 1L1-61102-AH-43 ..... N81-14303
N81-14304
DA PROJ. 1L1-62209-AH-76 ..... N81-13965
DA PROJ. 1R6-65706-M-541 ..... N81-14377
DA PROJ. 1R7-65706-M-541 ..... N81-13988
DA PROJ.1X7-63707-D-245 ..... N81-14197
DAAB07-76-C-8085 ..... N81-14197
DAAB07-77-C-0476 ..... N81-14203
DAAB07-77-C-0585 ..... N81-14243
DAAG27-79-C-0161 ..... N81-14753
DAAG29-76-C-0270 ..... N81-14107
DAAG29-76-G-0049 ..... N81-14107
DAAG29-76-G-0161 ..... N81-14245
DAAG29-76-G-0321 ..... N81-14088
DAAG29-77-C-0001 ..... N81-14382
DAAG29-77-C-0036 ..... N81-14870
DAAG29-77-C-0047 ..... N81-14060
DAAG29-77-G-0114 ..... N81-14662
DAAG29-77-G-0142 ..... N81-14031
DAAG29-78-G-0153 ..... N81-14107
DAAG29-79-C-0072 ..... N81-14582
DAAG29-79-C-0140 ..... N81-14107
DAAG29-79-C-0158 ..... N81-14340
DAAG29-79-G-0047 ..... N81-14088
DAAG29-79-M-0125 ..... N81-14804
DAAG46-78-C-0030 ..... N81-14324
DAAG46-78-C-0058 ..... N81-14008
DAAK40-78-C-0146 ..... N81-14086
DAAK50-80-C-0011 ..... N81-13954
DAAK51-79-C-0055 ..... N81-13965
DAAK70-77-C-0223 ..... N81-14661
DAAK70-79-C-0070 ..... N81-14378
DAAK70-79-C-0147 ..... N81-14381
DE-AC01-76-ET-10354 ..... N81-14479
DE-AC01-76ET-10541 ..... N81-14071
DE-AC01-77ET-10679 ..... N81-14130
DE-AC01-77ET-20160 ..... N81-14546
N81-14586
N81-14587
N81-14588
N81-14589
DE-AC01-77ET-26934 ..... N81-14448
DE-AC01-79CS-50009 ..... N81-14113
DE-AC01-79ET-13547 ..... N81-14070
DE-AC01-79ET-14800 ..... N81-14116
DE-AC01-79ET-14809 ..... N81-14118
DE-AC01-79ET-15440 ..... N81-14432
DE-AC01-79ET-15529 ..... N81-14875
DE-AC01-79ET-23106 ..... N81-14441
DE-AC01-79ET-23108 ..... N81-14442
DE-AC02-76BR-03077 ..... N81-14908
DE-AC02-76CH-00016 ..... N81-13998
N81-14129
N81-14469
N81-14477
DE-AC02-76CH-03000 ..... N81-14549
DE-AC02-76CH-03073 ..... N81-14889
DE-AC02-76ER-3326 ..... N81-14607
DE-AC02-76ER-01198 ..... N81-14824
DE-AC02-76ER-02172 ..... N81-14358
DE-AC02-76ER-02490 ..... N81-14811
DE-AC02-76ER-02995 ..... N81-14903
DE-AC02-76ER-03130 ..... N81-14912
DE-AC02-76ER-03235 ..... N81-14825
DE-AC02-76ET-29054 ..... N81-14251
DE-AC02-77CH-00178 ..... N81-14481
N81-14482
N81-14483
DE-AC02-77CS-34482 ..... N81-14422
DE-AC02-77CS-40056 ..... N81-14093
DE-AC02-77EV-04320 ..... N81-14045
DE-AC02-77EV-04327 ..... N81-14510
DE-AC02-78CS-54867 ..... N81-14329
DE-AC02-78ET-20604 ..... N81-14608
DE-AC02-79CS-30122 ..... N81-14490
DE-AC02-79ER-10389 ..... N81-14066
DE-AC02-79ER-10458 ..... N81-14815
DE-AC02-79ER-10488 ..... N81-14115
DE-AC02-79ET-10815 ..... N81-14433
DE-AC02-79ET-15423 ..... N81-14431
DE-AC02-79ET-15613 ..... N81-14435
DE-AC02-79ET-23029 ..... N81-14128
DE-AC02-79ET-26106 ..... N81-14439
DE-AC02-79ET-27255 ..... N81-14278
DE-AC02-79ET-53087 ..... N81-14876
DE-AC02-80ER-10554 ..... N81-14114
DE-AC02-80ER-10570 ..... N81-14363
DE-AC02-80ET-17019 ..... N81-14436
DE-AC03-77ET-11313 ..... N81-14042
DE-AC03-79ET-15383 ..... N81-14430
N81-14463
DE-AC03-79ET-15425 ..... N81-14327
DE-AC03-79ET-23040 ..... N81-14419
DE-AC03-79ET-23046 ..... N81-14443
DE-AC03-79ET-23047 ..... N81-14420
DE-AC03-79PE-70090 ..... N81-14457
DE-AC03-79SF-10534 ..... N81-14460
DE-AC03-80ER-53092 ..... N81-14874
DE-AC04-76DP-00053 ..... N81-14051
N81-14409
DE-AC04-76DP-00613 ..... N81-14014
N81-14330
DE-AC04-76DP-00656 ..... N81-14468
N81-14800
DE-AC04-76DP-00789 ..... N81-14039
N81-14040
N81-14277
N81-14413
N81-14415
N81-14416
N81-14700
N81-14807
N81-14901
DE-AC04-76DP-03533 ..... N81-14475
N81-14476
DE-AC04-78ET-23061 ..... N81-14444
DE-AC04-79CS-30171 ..... N81-14492
DE-AC04-79ET-23009 ..... N81-14438
N81-14446
DE-AC04-79ET-23011 ..... N81-14445
DE-AC05-76ET-53036 ..... N81-14817
DE-AC05-78OR-13513 ..... N81-14068
DE-AC05-79ET-15359 ..... N81-14092
DE-AC06-76RL-01830 ..... N81-14072
N81-14131
N81-14464
N81-14466
N81-14883
N81-14929
DE-AC07-76ID-01570 ..... N81-14280
N81-14641
DE-AC07-79ID-01675 ..... N81-14910
DE-AC07-79ID-12050 ..... N81-14123
DE-AC07-80ID-12079 ..... N81-14252
DE-AC08-78DP-40006 ..... N81-14872
DE-AC08-78DP-40020 ..... N81-14839
DE-AC08-78DP-40054 ..... N81-14307
DE-AC09-76SR-00001 ..... N81-14592
N81-14827
DE-AC19-79BC-10025 ..... N81-14295
DE-AC22-79ET-13395 ..... N81-14119
DE-AC22-79ET-14800 ..... N81-14117
DE-AC22-80PC-30094 ..... N81-14124
DE-AG02-76ET-20279 ..... N81-14437
DE-AI01-77CS-51040 ..... N81-14082
DE-AI01-77ET-10350 ..... N81-14396
N81-14399

DE-AI01-79ER-10035 ..... N81-14508
DE-AI01-79ET-27025 ..... N81-14499
DE-AL01-79ET-27025 ..... N81-14386
DE-AM03-76SF-00034 ..... N81-14089
DE-AP01-79EV-10014 ..... N81-14799
DE-AS01-78CS-34218 ..... N81-14491
DE-AS02-76ER-02383 ..... N81-14759
DE-AS02-76ER-02696 ..... N81-14809
DE-AS02-76ER-02733 ..... N81-14364
DE-AS02-76ER-02751 ..... N81-14775
DE-AS02-76ER-04052 ..... N81-14826
DE-AS02-77ET-29100 ..... N81-14447
DE-AS02-78ER-04695 ..... N81-14049
DE-AS02-78ER-05002 ..... N81-14904
N81-14905
DE-AS05-OR-12313 ..... N81-14344
DE-AS05-76EV-04814 ..... N81-14043
DE-AS05-79ER-10475 ..... N81-14067
DE-AS06-76ET-20274 ..... N81-14434
DE-AS06-78ET-20560 ..... N81-14593
DE-AS08-76ER-00888 ..... N81-14425
DE-AT03-76ER-70296 ..... N81-14069
DE-AT03-76ET-35300 ..... N81-14094
DE-AT03-76ET-35301 ..... N81-14833
DE-AT03-76ET-51011 ..... N81-14255
DE-AT03-76SF-71061 ..... N81-14832
DE-A101-79ET-20485 ..... N81-14391
DE-A101-79ET-21036 ..... N81-14489
DE-A102-79CH-10003 ..... N81-14507
DE-FC07-79ID-12010 ..... N81-14454
DE-FG02-79R5-10122 ..... N81-14459
DE-FG02-79R5-10143 ..... N81-14465
DE-FG04-79AL-10887 ..... N81-14902
DEN3-49 ..... N81-14391
DI-14-34-0001-0146 ..... N81-14934
DI-14-34-0001-8062 ..... N81-14524
DI-14-34-0001-9046 ..... N81-14934
DNA001-77-C-0096 ..... N81-14539
DNA001-77-C-0272 ..... N81-14207
DO-A01-78-00-3104 ..... N81-14183
DOT-FA72WAI-356 ..... N81-13939
DOT-FA77WA-3992 ..... N81-14756
DOT-FA79-WA-4335 ..... N81-14202
DOT-FA79NA-6040 ..... N81-14625
DOT-FA79WA-4279 ..... N81-13949
DOT-FA79WAI-005 ..... N81-14541
EA-77-A-01-6010 ..... N81-14261
EC-76-A-1017-002 ..... N81-14008
EC-77-A-31-1011 ..... N81-14082
EC-77-A-31-1101 ..... N81-14398
EC-77-C-02-2911 ..... N81-14283
EC-77-S-02-4206 ..... N81-14447
EC-88-C-01-8694 ..... N81-14449
EE-77-S-02-4320 ..... N81-14046
EF-76-C-01-2046 ..... N81-14120
EF-77-C-01-2468 ..... N81-14130
EF-77-S-05-5603 ..... N81-14089
EG-77-A-01-4030 ..... N81-14393
EG-77-A-01-4089 ..... N81-14394
EG-77-C-01-4016 ..... N81-14546
EG-77-C-01-4042 ..... N81-14483
EG-77-C-02-4231 ..... N81-14871
EG-77-C-02-4388 ..... N81-14121
EG-77-G-01-6037 ..... N81-14461
EG-77-S-02-2733 ..... N81-14359
N81-14360
N81-14361
N81-14362
EG-77-S-02-4217 ..... N81-14091
EI-78-X-01-5580 ..... N81-14491
EPA-IAG-DS-E681 ..... N81-14056
EPA-IAG-D8-E684 ..... N81-14053
EPA-R-803086 ..... N81-14610
EPA-R-803238 ..... N81-14385
EPA-R-805117 ..... N81-14054
EPA-68-02-2608 ..... N81-14519
N81-14520
EPA-68-03-2550 ..... N81-14521
EPA-68-03-2667 ..... N81-14055
EPRI PROJ. 421-1 ..... N81-14331
EPRI PROJ. 422-3 ..... N81-14466
EPRI PROJ. 979-5 ..... N81-14073
EPRI PROJ. 1276-1 ..... N81-14467
EPRI PROJ. 1308-2 ..... N81-14514
EPRI PROJ. 1651-3 ..... N81-14478
ER-78-S-05-6027 ..... N81-14818
ES-77-02-4199-A003 ..... N81-14816
ESA-3269/77/NL-AK(SC) N81-13985
ESTEC-2578/75-PP(SC) N81-14105
ESTEC-2685/78/MI(JS) N81-14836
ESTEC-4089/79-NL-PP(SC) N81-14837
ESTEC-4113/79-NL-AK(SC) N81-14106
ET-78-C-03-2234 ..... N81-14418
ET-78-S-02-4636 ..... N81-14881
EX-76-A-29-1060 ..... N81-14397
EX-76-A-36-1008 ..... N81-14386
N81-14498
N81-14499
EX-76-C-01-1760 ..... N81-14433
EX-76-C-01-1806 ..... N81-14332
EX-76-C-01-2452 ..... N81-14071
EX-76-C-01-3871 ..... N81-14488
EY-76-S-02-2383 ..... N81-14759
EY-76-S-02-2751 ..... N81-14775
EY-76-S-02-2874 ..... N81-14517
EY-76-S-02-3230 ..... N81-14813
EY-76-S-05-3948 ..... N81-14814
EY-76-S-06-2434 ..... N81-14257
EY-77-G-06-1059 ..... N81-14590
FAA PROJ. 045-390-130 ..... N81-13945
FCC-PO-0245 ..... N81-14211
FMV-F-K-80123-78-017-21-001 ..... N81-13925
FMV-F-K-82223-77-001-21-001 ..... N81-14354
F04611-77-C-0045 ..... N81-13995
F04701-79-C-0080 ..... N81-14159
N81-14489
F08635-77-C-0254 ..... N81-14380
F19628-76-C-0087 ..... N81-14540
F19628-77-C-0020 ..... N81-14542
F19628-78-C-0002 ..... N81-13982
F19628-78-C-0137 ..... N81-14580
F19628-79-C-0059 ..... N81-13986
F19628-79-C-0098 ..... N81-14543
F19628-80-C-0002 ..... N81-14247
N81-14924
F29601-79-C-0041 ..... N81-13978
F30602-77-C-0148 ..... N81-14198
F30602-78-C-0083 ..... N81-14249
F30602-78-C-0099 ..... N81-14665
F30602-78-C-0120 ..... N81-14200
F30602-79-C-0011 ..... N81-14200
F30602-79-C-0204 ..... N81-14666
F33615-76-C-5191 ..... N81-14061
F33615-77-C-3077 ..... N81-13976
F33615-77-C-5036 ..... N81-14063
F33615-78-C-2008 ..... N81-14325
F33615-78-D-0629 ..... N81-14038
F33615-79-C-0607 ..... N81-14032
F33615-79-C-3406 ..... N81-13940
F33615-79-C-3605 ..... N81-14326
F33615-79-C-5011 ..... N81-14087
F40600-78-C-0003 ..... N81-13977
F40600-79-C-0003 ..... N81-14302
F49620-77-C-0066 ..... N81-14789
F49620-77-C-0101 ..... N81-14771
F49620-78-C-0030 ..... N81-14786
F49620-78-C-0059 ..... N81-14196
F49620-79-C-0106 ..... N81-14770
F49620-79-C-0119 ..... N81-14635
F49620-79-C-0200 ..... N81-14755
GEN. ATOMIC PROJ. 3235 ..... N81-14255
GEN. ATOMIC PROJ. 7200 ..... N81-14832
MB-79-581 ..... N81-14178
MDA903-79-C-0188 ..... N81-14899
MDA903-79-C-0687 ..... N81-14660
METC-80-C-0001 ..... N81-14208
NAG3-67 ..... N81-14789
NASA ORDER L-11593 ..... N81-13941
NASW-3392 ..... N81-14503
NAS1-14101 ..... N81-14908
NAS1-14174 ..... N81-13993
NAS1-14849 ..... N81-13923
NAS1-15341 ..... N81-14696
NAS1-15534 ..... N81-13920
NAS1-15663 ..... N81-14554
NAS1-15783 ..... N81-14696
NAS1-15795 ..... N81-14696
NAS1-16078 ..... N81-14646
NAS3-19698 ..... N81-14082
NAS3-21254 ..... N81-14267
NAS3-21272 ..... N81-13963
NAS4-2534 ..... N81-13969
NAS4-2745 ..... N81-14504
NAS6-2639 ..... N81-14601
NAS7-100 ..... N81-14372
N81-14395
NAS8-31325 ..... N81-14222
NAS8-32692 ..... N81-14555
NAS8-33132 ..... N81-14491
NAS8-33601 ..... N81-14392
NAS9-11657 ..... N81-14151
NAS9-12932 ..... N81-14151
NAS9-14192 ..... N81-14151
NAS9-14523 ..... N81-14151
NAS9-14880 ..... N81-14614
NAS9-15217 ..... N81-14288
NAS9-15470 ..... N81-14624
NAS9-15487 ..... N81-14151
NAS9-15800 ..... N81-14018
N81-14648
NAS9-15887 ..... N81-14615
NB79-SBCA-0320 ..... N81-14642
NCA-2-OR-525-901 ..... N81-14908
NGL 05-002-069 ..... N81-14366
NGL-05-002-069 ..... N81-14365
N81-14367
N81-14368
N81-14369
NGL-05-020-272 ..... N81-14943
NGR-05-017-998 ..... N81-14914
NGR-25-001-055 ..... N81-14692
NOAA-04-78-B01-15 ..... N81-14603
NR PROJ. 042-280 ..... N81-14769
N81-14784
N81-14785
NR PROJ. 047-048 ..... N81-14768
NR PROJ. 049-360 ..... N81-14920
NR PROJ. 056-749 ..... N81-14306
N81-14805
NR PROJ. 154-445 ..... N81-14765
NR PROJ. 196-160 ..... N81-14669
NR PROJ. 274-317 ..... N81-14668
NR PROJ. 277-236 ..... N81-14774
NR PROJ. 318-009 ..... N81-14011
NR PROJ. 393-004 ..... N81-14806
NRC-A-4805 ..... N81-14743
NRC-A-7700 ..... N81-14729
NSF DAR-79-17457 ..... N81-14609
NSF DMR-76-80847 ..... N81-14037
N81-14900
NSF DMR-79-23573 ..... N81-14037
NSF ENG-78-26500 ..... N81-14781
NSF MCS-78-02591 ..... N81-14665
NSF MCS-79-00774 ..... N81-14753
NSF MCS-79-09495 ..... N81-14665
NSF OCE-77-8633 ..... N81-14551
NSF OCE-77-82255 ..... N81-14551
NSF OCE-79-19258 ..... N81-14551
NSF PER-78-16404 ..... N81-14135
NSF RIM-78-16987 ..... N81-14940
NSG-1087 ..... N81-14717
NSG-1248 ..... N81-14691
NSG-1342 ..... N81-14801
NSG-1490 ..... N81-14347
NSG-1577 ..... N81-14692
NSG-1619 ..... N81-14266
NSG-2184 ..... N81-14531
NSG-3269 ..... N81-14337
N00004-75-C-0440 ..... N81-14920
N00014-75-C-0332 ..... N81-14108
N00014-75-C-0439 ..... N81-14769
N81-14784
N81-14785
N00014-75-C-0602 ..... N81-14033
N00014-75-C-0621 ..... N81-14768
N81-14916
N00014-75-C-0673 ..... N81-14943
N00014-75-C-0816 ..... N81-14665
N00014-75-C-0963 ..... N81-14248
N00014-76-C-0068 ..... N81-14064
N00014-76-C-0368 ..... N81-14011
N00014-76-C-0687 ..... N81-14665
N00014-76-C-0826 ..... N81-13997
N00014-77-C-0231 ..... N81-14037
N81-14900
N00014-77-C-0426 ..... N81-14085
N00014-77-C-0438 ..... N81-14766
N81-14772
N81-14773
N00014-78-C-0373 ..... N81-14153
N00014-78-C-0584 ..... N81-14798
N00014-79-C-0595 ..... N81-14669
N00014-79-C-0650 ..... N81-14668
N00014-79-C-0752 ..... N81-14765
N00014-79-C-0832 ..... N81-14774
N00014-79-C-0906 ..... N81-14921
N81-14922
N00014-80-C-0149 ..... N81-14806
N00014-80-C-0243 ..... N81-14034
N00014-80-C-0387 ..... N81-14659

N00014-80-C-0472 ..... N81-14306
N81-14805
N00024-79-C-6043 ..... N81-14274
N81-14797
N62269-78-C-0433 ..... N81-13961
N62271-79-M-1679 ..... N81-14579
N68305-79-C-0009 ..... N81-14175
N81-14176
N81-14177
N68335-76-C-1136 ..... N81-13953
OWRT PROJ. A-046-TEX(1) N81-14934
PROJ. AFS-560-79-17 ..... N81-13956
RR03103 ..... N81-14376
RR0110941 ..... N81-14250
RR0130143 ..... N81-14036
RR0220146 ..... N81-14065
SRI PROJ. 5862 ..... N81-14382
SRI PROJ. 8558 ..... N81-14431
SWED-EPB-7-120/74 ..... N81-14533
SWED-EPB-7-151/75 ..... N81-14533
SWED-EPB-7-151/76 ..... N81-14533
SWED-EPB-7-151/77 ..... N81-14533
W-31-100-ENG-38 ..... N81-14930
W-31-109-ENG-38 ..... N81-14056
N81-14328
N81-14480
N81-14515
N81-14548
N81-14761
N81-14932
N81-14933
W-7405-ENG-26 ..... N81-14047
N81-14048
N81-14180
N81-14254
N81-14282
N81-14296
N81-14462
N81-14474
N81-14512
N81-14513
N81-14545
N81-14670
N81-14760
N81-14819
N81-14828
N81-14882
N81-14885
N81-14886
N81-14887
N81-14888
N81-14890
N81-14925
N81-14938
W-7405-ENG-36 ..... N81-14050
N81-14256
N81-14281
N81-14341
N81-14473
N81-14544
N81-14550
N81-14831
N81-14884
N81-14940
W-7405-ENG-48 ..... N81-14052
N81-14074
N81-14132
N81-14179
N81-14333
N81-14334
N81-14471
N81-14472
N81-14484
N81-14485
N81-14486
N81-14487
N81-14594
N81-14820
N81-14891
N81-14892
N81-14893
N81-14894
N81-14911
//F5752401 ..... N81-13953
//F41400000 ..... N81-13961
//F52561792 ..... N81-13989
//R0330200 ..... N81-14584
//R59553000 ..... N81-14383
//F60534091 ..... N81-14175
N81-14176
N81-14177
ZF12151001 ..... N81-14206
ZR0000101 ..... N81-14767
63-2303-4109 ..... N81-14648
170-36-55 ..... N81-14530
199-20-62 ..... N81-14606
501-31-33-05 ..... N81-13921
505-06-64 ..... N81-13969
505-10-13-16 ..... N81-13923
505-31-83-02 ..... N81-14690
505-32-03-01 ..... N81-14788
505-32-13-11 ..... N81-13919
505-33-33-02 ..... N81-14080
N81-14081
505-33-53-01 ..... N81-13922
505-33-63-02 ..... N81-14347
505-34-23-01 ..... N81-13958
505-34-33-05 ..... N81-13968
505-41-73-01 ..... N81-13959
505-51-11 ..... N81-14265
506-16 ..... N81-14322
506-51-13-02 ..... N81-13915
506-51-33-01 ..... N81-14554
506-52-33-01 ..... N81-14017
506-53 ..... N81-14079
506-53-23-01 ..... N81-14001
506-53-63-04 ..... N81-14343
506-54-93-02 ..... N81-13992
543-03-23-01 ..... N81-14002
776-81-41 ..... N81-14397
778-11-06 ..... N81-14396
947-48-32 ..... N81-14398
953-36-00-00-72 ..... N81-14138

REPORT/ACCESSION NUMBER INDEX

Typical Report/Accession Number Index Listing



Listings in this index are arranged alpha-numerically by report number. The NASA accession number denotes the number by which the citation is identified. An asterisk (*) indicates that the item is a NASA report. A pound sign (#) indicates that the item is available on microfiche.

A-8408 ..... N81-14265* #
A-8416 ..... N81-14606* #

AASU-342 ..... N81-14028 #

AC-45 ..... N81-14533 #

AD-A091045 ..... N81-14688 #
AD-A091343 ..... N81-14774 #
AD-A091407 ..... N81-14012 #
AD-A091408 ..... N81-14585 #
AD-A091412 ..... N81-14111 #
AD-A091419 ..... N81-14636 #
AD-A091502 ..... N81-14754 #
AD-A091503 ..... N81-14786 #
AD-A091504 ..... N81-14383 #
AD-A091506 ..... N81-14036 #
AD-A091507 ..... N81-14065 #
AD-A091508 ..... N81-14923 #
AD-A091511 ..... N81-14250 #
AD-A091514 ..... N81-14769 #
AD-A091515 ..... N81-14785 #
AD-A091516 ..... N81-14784 #
AD-A091517 ..... N81-14176 #
AD-A091518 ..... N81-14584 #
AD-A091521 ..... N81-14916 #
AD-A091522 ..... N81-14768 #
AD-A091533 ..... N81-14663 #
AD-A091534 ..... N81-14037 #
AD-A091535 ..... N81-14900 #
AD-A091539 ..... N81-14767 #
AD-A091540 ..... N81-14293 #
AD-A091543 ..... N81-14276 #
AD-A091545 ..... N81-13932 #
AD-A091547 ..... N81-13967 #
AD-A091550 ..... N81-13997 #
AD-A091551 ..... N81-14770 #
AD-A091553 ..... N81-14668 #
AD-A091554 ..... N81-14087 #
AD-A091559 ..... N81-13976 #
AD-A091561 ..... N81-14382 #
AD-A091563 ..... N81-14326 #
AD-A091570 ..... N81-14771 #
AD-A091578 ..... N81-14766 #
AD-A091580 ..... N81-14202 #
AD-A091586 ..... N81-14246 #
AD-A091587 ..... N81-13988 #
AD-A091588 ..... N81-14619 #
AD-A091600 ..... N81-14381 #
AD-A091602 ..... N81-14063 #
AD-A091603 ..... N81-13954 #
AD-A091604 ..... N81-14086 #
AD-A091605 ..... N81-14797 #
AD-A091606 ..... N81-14582 #
AD-A091607 ..... N81-14340 #
AD-A091608 ..... N81-14662 #
AD-A091609 ..... N81-14245 #
AD-A091611 ..... N81-14806 #
AD-A091614 ..... N81-14669 #
AD-A091615 ..... N81-14011 #
AD-A091616 ..... N81-14177 #
AD-A091618 ..... N81-14178 #
AD-A091619 ..... N81-14201 #
AD-A091621 ..... N81-14924 #
AD-A091622 ..... N81-14247 #
AD-A091631 ..... N81-14541* #
AD-A091634 ..... N81-13978 #
AD-A091637 ..... N81-13945 #
AD-A091638 ..... N81-14248 #
AD-A091639 ..... N81-14665 #
AD-A091641 ..... N81-14088 #
AD-A091642 ..... N81-13939 #
AD-A091644 ..... N81-14664 #
AD-A091645 ..... N81-14753 #
AD-A091646 ..... N81-14798 #
AD-A091653 ..... N81-14667 #
AD-A091654 ..... N81-14204 #
AD-A091655 ..... N81-14687 #
AD-A091658 ..... N81-14010 #
AD-A091659 ..... N81-14206 #
AD-A091661 ..... N81-14838 #
AD-A091664 ..... N81-13989 #
AD-A091665 ..... N81-14583 #
AD-A091667 ..... N81-14038 #
AD-A091668 ..... N81-14620 #
AD-A091670 ..... N81-14625 #
AD-A091674 ..... N81-13955 #
AD-A091675 ..... N81-14755 #
AD-A091678 ..... N81-14032 #
AD-A091682 ..... N81-14666 #
AD-A091683 ..... N81-14034 #
AD-A091687 ..... N81-14325 #
AD-A091689 ..... N81-14379 #
AD-A091691 ..... N81-14378 #
AD-A091693 ..... N81-14765 #
AD-A091694 ..... N81-14061 #
AD-A091695 ..... N81-14275 #
AD-A091697 ..... N81-14199 #
AD-A091704 ..... N81-14686 #
AD-A091707 ..... N81-14110 #
AD-A091710 ..... N81-14035 #
AD-A091712 ..... N81-13966 #
AD-A091714 ..... N81-14033 #
AD-A091715 ..... N81-14635 #
AD-A091717 ..... N81-14380 #
AD-A091718 ..... N81-14543 #
AD-A091719 ..... N81-13986 #
AD-A091721 ..... N81-14542 #
AD-A091724 ..... N81-14205 #
AD-A091732 ..... N81-14756 #
AD-A091733 ..... N81-14772 #
AD-A091734 ..... N81-14773 #
AD-A091736 ..... N81-14661 #
AD-A091738 ..... N81-14175 #
AD-A091744 ..... N81-14540 #
AD-A091745 ..... N81-14249 #
AD-A091747 ..... N81-14306 #
AD-A091748 ..... N81-14805 #
AD-A091749 ..... N81-13982 #
AD-A091750 ..... N81-14085 #
AD-A091751 ..... N81-14200 #
AD-A091752 ..... N81-14580 #
AD-A091755 ..... N81-13965 #
AD-A091756 ..... N81-14324 #
AD-A091757 ..... N81-14008 #
AD-A091758 ..... N81-13961 #
AD-A091760 ..... N81-14660 #
AD-A091762 ..... N81-14302 #
AD-A091764 ..... N81-14197 #
AD-A091765 ..... N81-14109 #
AD-A091772 ..... N81-14637 #
AD-A091774 ..... N81-13977 #
AD-A091775 ..... N81-13931 #
AD-A091777 ..... N81-13953 #
AD-A091778 ..... N81-14198 #
AD-A091779 ..... N81-14638 #
AD-A091784 ..... N81-14244 #
AD-A091785 ..... N81-14084 #
AD-A091787 ..... N81-14339 #
AD-A091788 ..... N81-13938 #
AD-A091789 ..... N81-14303* #
AD-A091791 ..... N81-14304* #
AD-A091792 ..... N81-14062 #
AD-A091795 ..... N81-14305 #
AD-A091800 ..... N81-14804 #
AD-A091802 ..... N81-14581 #
AD-A091805 ..... N81-13987 #
AD-A091806 ..... N81-14207 #
AD-A091810 ..... N81-13940 #
AD-A091815 ..... N81-14196 #
AD-A091817 ..... N81-14943* #
AD-A091820 ..... N81-14274 #
AD-A091821 ..... N81-14659 #
AD-A091822 ..... N81-14899 #
AD-A091823 ..... N81-14031 #
AD-A091839 ..... N81-13995 #
AD-A091841 ..... N81-14579 #
AD-A091842 ..... N81-14920 #
AD-A091845 ..... N81-14539 #
AD-A091850 ..... N81-14376 #
AD-A091852 ..... N81-14107 #
AD-A091853 ..... N81-14870 #
AD-A091854 ..... N81-14243 #
AD-A091855 ..... N81-14377 #
AD-A091857 ..... N81-14108 #
AD-A091858 ..... N81-14009 #
AD-A091859 ..... N81-14060 #
AD-A091861 ..... N81-14064 #
AD-A091863 ..... N81-14203 #
AD-A091864 ..... N81-14921 #
AD-A091866 ..... N81-14922 #

AD-E299589 ..... N81-14305 #
AD-E430525 ..... N81-14304* #
AD-E430526 ..... N81-14303* #
AD-E440096 ..... N81-14062 #
AD-E900008 ..... N81-14084 #
AD-E900014 ..... N81-13938 #
AD-E900026 ..... N81-14244 #
AD-E900027 ..... N81-14339 #

AEDC-TR-79-63 ..... N81-13932 #
AEDC-TR-80-8 ..... N81-13931 #
AEDC-TR-80-20 ..... N81-14275 #
AEDC-TR-80-28 ..... N81-14302 #
AEDC-TR-80-34 ..... N81-13977 #

AEDC-TSR-79-V60 ..... N81-13987 #

AEROCHEM-TP-394 ..... N81-14032 #

AERONOMICA-ACTA-A-215-1980 ..... N81-14527
AERONOMICA-ACTA-A-217-1980 ..... N81-14528
AERONOMICA-ACTA-A-219-1980 ..... N81-14529

AERONOMICA-ACTA-F-30-1980 ..... N81-13983

AES-8005 ..... N81-14772 #
AES-8006 ..... N81-14766 #
AES-8007 ..... N81-14773 #

AFESC/ESL-TR-80-29 ..... N81-14380 #

AFFDL-TR-79-3117-VOL-2 ..... N81-13976 #

AFGL-TR-80-0157 ..... N81-14540 #
AFGL-TR-80-0179 ..... N81-13986 #
AFGL-TR-80-0206 ..... N81-14542 #
AFGL-TR-80-0289 ..... N81-14543 #

AFGL-TR-80-0309 ..... N81-14580 #

AFIT-CI-79-240T ..... N81-14111 #
AFIT-CI-79-249D ..... N81-14012 #
AFIT-CI-79-268D ..... N81-14585 #

AFLRL-84 ..... N81-13953 #

AFOSR-80-0985TR ..... N81-14754 #
AFOSR-80-1017TR ..... N81-14635 #
AFOSR-80-1021TR ..... N81-14771 #
AFOSR-80-1022TR ..... N81-14786 #
AFOSR-80-1038TR ..... N81-14688 #
AFOSR-80-1039TR ..... N81-13955 #
AFOSR-80-1065TR ..... N81-14009 #
AFOSR-80-1118TR ..... N81-14755 #
AFOSR-80-1134TR ..... N81-14196 #
AFOSR-80-1145TR ..... N81-14686 #
AFOSR-80-1148TR ..... N81-14753 #
AFOSR-80-1153TR ..... N81-14664 #

AFRPL-TR-80-35 ..... N81-13995 #

AFWAL-TR-80-2023 ..... N81-14276 #
AFWAL-TR-80-2057 ..... N81-14325 #
AFWAL-TR-80-3074 ..... N81-14326 #
AFWAL-TR-80-3084 ..... N81-13940 #
AFWAL-TR-80-4048 ..... N81-14087 #
AFWAL-TR-80-4075 ..... N81-14061 #

AFWL-TR-79-43 ..... N81-14305 #
AFWL-TR-80-4109 ..... N81-14063 #

AH-45376 ..... N81-14394*#

AIRESEARCH-21-3517 ..... N81-14267*#

ALO-86 ..... N81-14357 #

AMMRC-MS-80-3 ..... N81-13967 #

AMMRC-TR-80-25 ..... N81-14324 #
AMMRC-TR-80-46 ..... N81-14008 #

AMSAA-TR-225 ..... N81-14377 #
AMSAA-TR-308 ..... N81-13988 #

ANL-80-84 ..... N81-14761 #

ANL/CEN/FE-79-14 ..... N81-14056 #

ANL/EES/TM-99 ..... N81-14515 #

ANL/ES-100-PT-1 ..... N81-14328 #

ANL/OEPM-79-8 ..... N81-14930 #
ANL/OEPM-79-9 ..... N81-14933 #
ANL/OEPM-79-11 ..... N81-14480 #
ANL/OEPM-79-14 ..... N81-14932 #

APE-79-021 ..... N81-14324 #

APL/JHU/QM-79-163R/GT-REV ..... N81-14386 #

AR-1 ..... N81-14066 #
AR-1 ..... N81-14902 #
AR-2 ..... N81-14480 #
AR-2 ..... N81-14590 #
AR-6 ..... N81-14598 #
AR-002-036 ..... N81-14575 #

ARB-R-80/122 ..... N81-14518 #
ARB-R-80/123 ..... N81-14523 #

ARBRL-TR-02260 ..... N81-14304*#
ARBRL-TR-02261 ..... N81-14303*#

ARL-TM-80-14 ..... N81-14288*#

ARL/PSU/TM-80-126 ..... N81-14797 #
ARL/PSU/TM-80-160 ..... N81-14274 #

ARLCB-TR-80037 ..... N81-14062 #

ARO-13108.1-E ..... N81-14107 #
ARO-13786.7-EL-X ..... N81-14245 #
ARO-13833.5-GS ..... N81-14382 #
ARO-14180.3-M ..... N81-14662 #
ARO-14200.1-E ..... N81-14107 #
ARO-14249.14-P ..... N81-14088 #

ARO-14511.7-C ..... N81-14031 #
ARO-14543.4-P ..... N81-14870 #
ARO-15042.4-MS ..... N81-14060 #
ARO-15994.2-E ..... N81-14107 #
ARO-16654.1-GS ..... N81-14582 #
ARO-16713.12-M ..... N81-14340 #
ARO-16931.1-M ..... N81-14804 #

ATR-81(8454)-2 ..... N81-14939 #

AVRADCOM-TR-79-49 ..... N81-13918*#

AWRE-O-30/80 ..... N81-14241 #

A212 ..... N81-14197 #

BDX-613-2482 ..... N81-14014 #
BDX-613-2485 ..... N81-14330 #

BMFT-FB-T-79 ..... N81-14633 #
BMFT-FB-T-79-16 ..... N81-14224 #
BMFT-FB-T-79-31 ..... N81-14534 #
BMFT-FB-T-79-32 ..... N81-13996 #
BMFT-FB-T-79-34 ..... N81-14400 #
BMFT-FB-T-79-36 ..... N81-14225 #
BMFT-FB-T-79-37 ..... N81-14897 #
BMFT-FB-T-79-41 ..... N81-14228 #
BMFT-FB-T-79-42 ..... N81-14022 #
BMFT-FB-T-79-43 ..... N81-14854 #
BMFT-FB-T-79-44 ..... N81-14229 #
BMFT-FB-T-79-48 ..... N81-14401 #
BMFT-FB-T-79-50 ..... N81-14230 #
BMFT-FB-T-79-51 ..... N81-14023 #
BMFT-FB-T-79-52 ..... N81-14898 #
BMFT-FB-T-79-55 ..... N81-14226 #
BMFT-FB-T-79-57 ..... N81-14402 #
BMFT-FB-T-79-85 ..... N81-14407 #
BMFT-FB-T-79-87 ..... N81-14231 #
BMFT-FB-T-79-88 ..... N81-14232 #
BMFT-FB-T-79-101 ..... N81-14403 #
BMFT-FB-T-79-103 ..... N81-14404 #
BMFT-FB-T-79-104 ..... N81-14233 #
BMFT-FB-T-79-105 ..... N81-14634 #
BMFT-FB-T-79-107 ..... N81-14227 #
BMFT-FB-T-79-108 ..... N81-14234 #
BMFT-FB-T-79-115 ..... N81-14235 #
BMFT-FB-T-79-160 ..... N81-14237 #
BMFT-FB-T-79-168 ..... N81-14238 #
BMFT-FB-T-79-173 ..... N81-14058 #
BMFT-FB-T-79-176 ..... N81-14239 #
BMFT-FB-T-79-181 ..... N81-14802 #
BMFT-FB-T-79-186 ..... N81-14918 #
BMFT-FB-T-80-017 ..... N81-14835 #

BMFT-FT-T-79-126 ..... N81-14236 #

BNL-28293 ..... N81-14477 #
BNL-28334 ..... N81-14129 #
BNL-28357 ..... N81-13998 #
BNL-51128 ..... N81-14469 #

BROWN-HET-437 ..... N81-14912 #

BR75025 ..... N81-14338 #
BR75251 ..... N81-14029 #
BR75399 ..... N81-14007 #
BR76023 ..... N81-14241 #
BR76037 ..... N81-13981 #
BR76376 ..... N81-14003 #

CAA-D-80-1 ..... N81-14667 #

CALSPAN-6339-F-3 ..... N81-13969*#
CALSPAN-6374-A-1 ..... N81-13977 #

CCVS74-VSR625 ..... N81-14676 #
CCVS74-VSR630 ..... N81-14675 #

CD 6500671 ..... N81-14837 #

CEL-CR-80 026 ..... N81-14175 #
CEL-CR-80 027 ..... N81-14176 #
CEL-CR-80 028 ..... N81-14177 #

CERL-E-14 ..... N81-14765 #

CERL-TR-M-281 ..... N81-14010 #

CISE 1521 ..... N81-14269 #
CISE-1526 ..... N81-14301 #
CISE-1527 ..... N81-14406 #
CISE-1528 ..... N81-14083 #

CLM/RR/E1/28 ..... N81-14836 #

CONF-790463-2 ..... N81-14890 #
CONF-790864 ..... N81-14481 #
CONF-800374-8 ..... N81-14808 #
CONF-800402-1 ..... N81-14039 #
CONF-800578-2 ..... N81-14833 #
CONF-800604-35 ..... N81-14414 #
CONF-800686-1 ..... N81-14411 #
CONF-800707-22-DRAFT ..... N81-14882 #
CONF-800802-17 ..... N81-14131 #
CONF-800870-1 ..... N81-14047 #
CONF-800871-1 ..... N81-14409 #
CONF-800872-5 ..... N81-14938*#
CONF-800917-3 ..... N81-14901 #
CONF-800927-2 ..... N81-14483 #
CONF-800963 ..... N81-14129 #
CONF-800973-1 ..... N81-14128 #
CONF-800979-1 ..... N81-14819 #
CONF-800979-4 ..... N81-14050 #
CONF-800980-5 ..... N81-14473 #
CONF-800980-6 ..... N81-14256 #
CONF-800980-11 ..... N81-14254 #
CONF-800980-13 ..... N81-14255 #
CONF-800983-1 ..... N81-14832 #
CONF-801011-6 ..... N81-14893 #
CONF-801011-9 ..... N81-14052 #
CONF-801037-17 ..... N81-14048 #
CONF-801037-19 ..... N81-14074 #
CONF-801055-2 ..... N81-14477 #
CONF-801109-1 ..... N81-14621 #
CONF-801114-1 ..... N81-14550 #
CONF-801116-1 ..... N81-14641 #
CONF-801122-1 ..... N81-14592 #
CONF-801124-1 ..... N81-14824 #
CONF-801124-2 ..... N81-14807 #
CONF-7906180 ..... N81-14548 #
CONF-7909175-1 ..... N81-14928 #
CONF-8003101-1 ..... N81-14594 #
CONF-8004103 ..... N81-14479 #
CONF-8004115-1 ..... N81-14759 #
CONF-8006127-1 ..... N81-13998 #

CONTRIB-3291 ..... N81-14365*#

COO-ET53051-4 ..... N81-14879 #

COO-2383-0068 ..... N81-14759 #
COO-2387-113 ..... N81-14895 #
COO-2733-25 ..... N81-14364 #
COO-2733-29 ..... N81-14362 #
COO-2751-4 ..... N81-14775 #
COO-2911-6 ..... N81-14283 #
COO-3130TA-352 ..... N81-14912 #
COO-4052-24 ..... N81-14826 #
COO-4217-5 ..... N81-14091 #
COO-4695-4 ..... N81-14049 #
COO-4867-07 ..... N81-14329 #

CRWR-172 ..... N81-14934 #

CSA-76-8085-F ..... N81-14197 #

CSC/TM-80/6240 ..... N81-14554*#

CSC/TR-936 ..... N81-14688 #

CTH-MATH-1980-1 ..... N81-14782 #

C79-302/501 ..... N81-14087 #
C80-569/201 ..... N81-13993*#

DA-ERO-78-G-111 ..... N81-14379 #

DELET-TR-77-0585-F ..... N81-14243 #

DFVLR-FB-79-22 ..... N81-14242 #
DFVLR-FB-79-37 ..... N81-13984 #
DFVLR-FB-79-41 ..... N81-14752 #
DFVLR-FB-80-01 ..... N81-14195 #
DFVLR-FB-80-04 ..... N81-13924 #
DFVLR-FB-80-05 ..... N81-14272 #
DFVLR-FB-80-06 ..... N81-13942 #
DFVLR-FB-80-07 ..... N81-13975 #
DFVLR-FB-80-08 ..... N81-14059 #
DFVLR-FB-80-09 ..... N81-13994 #
DFVLR-FB-80-10 ..... N81-13943 #

DFVLR-FB-80-11 ..... N81-14273 #
DFVLR-FB-80-12 ..... N81-14408 #
DFVLR-FB-80-13 ..... N81-13944 #
DFVLR-FB-80-14 ..... N81-13970 #
DFVLR-FB-80-15 ..... N81-14622 #
DFVLR-FB-80-16 ..... N81-14796 #
DFVLR-FB-80-17 ..... N81-14030 #
DFVLR-FB-80-18 ..... N81-13927 #
DFVLR-FB-80-19 ..... N81-13928 #
DFVLR-FB-80-22 ..... N81-13929 #

DFVLR-MITT-79-14 ..... N81-14289 #
DFVLR-MITT-79-15 ..... N81-14791 #
DFVLR-MITT-79-16 ..... N81-13971 #
DFVLR-MITT-79-17 ..... N81-14188 #
DFVLR-MITT-79-18 ..... N81-14576 #
DFVLR-MITT-79-21 ..... N81-14680 #
DFVLR-MITT-80-02 ..... N81-14348 #
DFVLR-MITT-80-03 ..... N81-14681 #
DFVLR-MITT-80-04 ..... N81-13960 #
DFVLR-MITT-80-05 ..... N81-13926 #
DFVLR-MITT-80-06 ..... N81-14618 #
DFVLR-MITT-80-07 ..... N81-13952 #

DMI-GEOPHYS-PAPERS-R-56 ..... N81-14536 #

DNA-4826-F ..... N81-14207 #
DNA-5339F ..... N81-14539 #

DOE/AL-10887 ..... N81-14902 #

DOE/BC-10025/18 ..... N81-14295 #

DOE/BETC-5603/10 ..... N81-14089 #

DOE/BETC/OR-14 ..... N81-14545 #

DOE/CH-00128/1 ..... N81-14427 #

DOE/CR-0015 ..... N81-14917 #

DOE/CS-0050 ..... N81-14428 #
DOE/CS-0171 ..... N81-14449 #
DOE/CS-04042/1 ..... N81-14429 #
DOE/CS-20043/T1 ..... N81-14283 #
DOE/CS-20160-01-VOL-4 ..... N81-14586 #
DOE/CS-20160-01-VOL-6 ..... N81-14587 #
DOE/CS-20160/01-VOL-1 ..... N81-14546 #
DOE/CS-20160/01-VOL-3 ..... N81-14589 #
DOE/CS-20160/01-VOL-5 ..... N81-14588 #
DOE/CS-21036/01 ..... N81-14489 #
DOE/CS-30122/4 ..... N81-14490 #
DOE/CS-30171/2A ..... N81-14492 #
DOE/CS-34218/T1 ..... N81-14491* #
DOE/CS-34223/T1 ..... N81-14458 #
DOE/CS-34482/4 ..... N81-14422 #
DOE/CS-40056/T2 ..... N81-14093 #
DOE/CS-40178/1-VOL-2 ..... N81-14906 #
DOE/CS-50009/01 ..... N81-14113 #

DOE/DE-80/003A ..... N81-14671 #

DOE/DF-80/003B ..... N81-14674 #

DOE/DP-40006/1 ..... N81-14872 #
DOE/DP-40020/1 ..... N81-14839 #
DOE/DP-40054/1 ..... N81-14307 #

DOE/EIA-0201/10 ..... N81-14423 #
DOE/EIA-0205/80-2Q ..... N81-14424 #
DOE/EIA-0239/79 ..... N81-14421 #

DOE/ER-0062 ..... N81-14873 #
DOE/ER-0082 ..... N81-14544 #
DOE/ER-00888/3 ..... N81-14425 #
DOE/ER-01198/1324 ..... N81-14824 #
DOE/ER-01388/457 ..... N81-14840 #
DOE/ER-01545/284 ..... N81-14907 #
DOE/ER-02172/35 ..... N81-14358 #
DOE/ER-02232/87 ..... N81-14808 #
DOE/ER-02490/1 ..... N81-14811 #
DOE/ER-02696/9 ..... N81-14809 #
DOE/ER-02733/26 ..... N81-14359 #
DOE/ER-02733/27 ..... N81-14360 #
DOE/ER-02733/28 ..... N81-14361 #
DOE/ER-02733/29 ..... N81-14362 #
DOE/ER-02837-T1 ..... N81-14810 #
DOE/ER-02845/T1 ..... N81-14090 #
DOE/ER-02995/4 ..... N81-14903 #
DOE/ER-03077/167 ..... N81-14908 #
DOE/ER-03230/T1 ..... N81-14813 #
DOE/ER-03235/1 ..... N81-14825 #
DOE/ER-03326/90 ..... N81-14607 #
DOE/ER-03948/12 ..... N81-14814 #
DOE/ER-03992/387 ..... N81-14909 #
DOE/ER-03992/388 ..... N81-14812 #
DOE/ER-04052/T1 ..... N81-14826 #
DOE/ER-04217/T1 ..... N81-14091 #
DOE/ER-04445/T1 ..... N81-14041 #
DOE/ER-05002/11 ..... N81-14905 #
DOE/ER-05002/13 ..... N81-14904 #
DOE/ER-06027/2 ..... N81-14818 #
DOE/ER-10003/T2 ..... N81-14507 #
DOE/ER-10035/01 ..... N81-14508* #
DOE/ER-10389/1 ..... N81-14066 #
DOE/ER-10458/1 ..... N81-14815 #
DOE/ER-10475/T1 ..... N81-14067 #
DOE/ER-10488-1 ..... N81-14115 #
DOE/ER-10554-T1 ..... N81-14114 #
DOE/ER-10570/1 ..... N81-14363 #
DOE/ER-14529/1 ..... N81-14509 #
DOE/ER-53092/13 ..... N81-14874 #
DOE/ER-70296/T1 ..... N81-14069 #

DOE/ES-04199/1 ..... N81-14816 #

DOE/ET-10603/T1 ..... N81-14120 #
DOE/ET-10815/47 ..... N81-14433 #
DOE/ET-11313/T1 ..... N81-14042 #
DOE/ET-12313/T1 ..... N81-14344 #
DOE/ET-13395/3-4 ..... N81-14119 #
DOE/ET-13513/T1 ..... N81-14068 #
DOE/ET-13547/T1 ..... N81-14070 #
DOE/ET-14800/11 ..... N81-14116 #
DOE/ET-14800/13 ..... N81-14117 #
DOE/ET-14809/3 ..... N81-14118 #
DOE/ET-15359/1 ..... N81-14092 #
DOE/ET-15383-22 ..... N81-14430 #
DOE/ET-15383/18 ..... N81-14463 #
DOE/ET-15423/4 ..... N81-14431 #
DOE/ET-15425/T1 ..... N81-14327 #
DOE/ET-15440/2 ..... N81-14432 #
DOE/ET-15529/T1 ..... N81-14875 #
DOE/ET-15613/T1 ..... N81-14435 #
DOE/ET-16106/T1 ..... N81-14439 #
DOE/ET-17019/1 ..... N81-14436 #
DOE/ET-20172 ..... N81-14590 #
DOE/ET-20274/7-PT-1 ..... N81-14434 #
DOE/ET-20279/103 ..... N81-14437 #
DOE/ET-20560/1 ..... N81-14593 #
DOE/ET-20604/1 ..... N81-14608 #
DOE/ET-21038/1-VOL-3 ..... N81-14418 #
DOE/ET-23009/T10 ..... N81-14438 #
DOE/ET-23009/T11 ..... N81-14446 #
DOE/ET-23011/1 ..... N81-14445 #
DOE/ET-23040/2 ..... N81-14419 #
DOE/ET-23046/3 ..... N81-14443 #
DOE/ET-23047/4 ..... N81-14420 #
DOE/ET-23061/1 ..... N81-14444 #
DOE/ET-23106/2 ..... N81-14441 #
DOE/ET-23108/3 ..... N81-14442 #
DOE/ET-23108/5 ..... N81-14440 #
DOE/ET-26934/1 ..... N81-14448 #
DOE/ET-27225/13 ..... N81-14278 #
DOE/ET-29054/1 ..... N81-14251 #
DOE/ET-29100/11 ..... N81-14447 #
DOE/ET-51010/8 ..... N81-14871 #
DOE/ET-52048/T1 ..... N81-14881 #
DOE/ET-53004/2 ..... N81-14822 #
DOE/ET-53036/18 ..... N81-14880 #
DOE/ET-53036/23 ..... N81-14817 #
DOE/ET-53045/1 ..... N81-14877 #
DOE/ET-53045/2 ..... N81-14878 #
DOE/ET-53051/4 ..... N81-14879 #
DOE/ET-53051/113 ..... N81-14895 #
DOE/ET-53073/T1 ..... N81-14869 #
DOE/ET-53087/2 ..... N81-14876 #
DOE/ET-200550/T1 ..... N81-14121 #

DOE/EV-0061/1 ..... N81-14426 #
DOE/EV-0072 ..... N81-14426 #
DOE/EV-0087 ..... N81-14122 #
DOE/EV-0089 ..... N81-14799 #
DOE/EV-0099 ..... N81-14450 #
DOE/EV-0101 ..... N81-14451 #
DOE/EV-0102 ..... N81-14452 #
DOE/EV-0103 ..... N81-14453 #
DOE/EV-0108 ..... N81-14125 #
DOE/EV-02874/59 ..... N81-14517 #
DOE/EV-04320/1 ..... N81-14045 #
DOE/EV-04320/3 ..... N81-14046 #
DOE/EV-04327/1 ..... N81-14510 #
DOE/EV-04814/T1 ..... N81-14043 #
DOE/EV-10040/2 ..... N81-14516 #
DOE/EV-10281/T2 ..... N81-14511 #
DOE/EV-100097/1 ..... N81-14591 #

DOE/FE-0002-79/2 ..... N81-14126 #

DOE/ID-12010/4 ..... N81-14454 #
DOE/ID-12050/3 ..... N81-14123 #
DOE/ID-12079/11 ..... N81-14252 #

DOE/MC-14143/T1 ..... N81-14208 #

DOE/METC/RI-80/16 ..... N81-14455 #

DOE/METC/SP-80/15 ..... N81-14044 #

DOE/NASA-10350-19 ..... N81-14399* #

DOE/NASA/0049-80/2 ..... N81-14391* #
DOE/NASA/1011-33 ..... N81-14398* #
DOE/NASA/1060-4 ..... N81-14397* #
DOE/NASA/9698-2 ..... N81-14082* #
DOE/NASA/10350-21 ..... N81-14396* #

DOE/NOAA/OTEC-1 ..... N81-14284 #

DOE/PC-30094/1 ..... N81-14124 #

DOE/PE-0020 ..... N81-14456 #
DOE/PE-03871/01 ..... N81-14488 #
DOE/PE-70090/01 ..... N81-14457 #

DOE/RA-50153/1 ..... N81-14253 #

DOE/RL-90369/8 ..... N81-14257 #

DOE/R5-10122/2 ..... N81-14459 #
DOE/R5-10143/T1 ..... N81-14465 #

DOE/SF-10535/1-1 ..... N81-14460 #

DOE/SR-00001/T2 ..... N81-14547 #

DOE/SR/WM-79/2 ..... N81-14827 #
DOE/SR/WM-79/3-REV-4/80 ..... N81-14829 #

DOE/TIC-1154 ..... N81-14461 #
DOE/TIC-11269 ..... N81-14127 #
DOE/TIC-11275 ..... N81-14462 #
DOE/TIC-11286 ..... N81-14512 #
DOE/TIC-11287 ..... N81-14828 #
DOE/TIC-11293 ..... N81-14279 #

DP-MS-80-81 ..... N81-14592 #

DR-1609 ..... N81-14415 #

DRIC-TRANS-6127 ..... N81-14029 #

DRSMI/RL-CR-80-5 ..... N81-14086 #

DSE-5580-T1 ..... N81-14931 #

DYNATECH-2021 ..... N81-14135 #
DYNATECH-2038 ..... N81-14121 #

D6-41840-2 ..... N81-13920* #

E-070 ..... N81-14322* #
E-475 ..... N81-14079* #
E-547 ..... N81-14337* #
E-614 ..... N81-14399* #
E-661 ..... N81-14396* #
E-675 ..... N81-14397* #
E-677 ..... N81-14398* #

EDR-1110 ..... N81-14391* #

EGG-2056 ..... N81-14280 #

EGG/ENI-143 ..... N81-14910 #

EPA-AA-TEB-80-19 ..... N81-14522 #

EPA-600/2-80-098 ..... N81-14054 #
EPA-600/3-80-061 ..... N81-14610 #
EPA-600/3-80-063 ..... N81-14385 #

EPA-600/7-80-123 ..... N81-14053 #
EPA-600/7-80-130 ..... N81-14055 #
EPA-600/7-80-135 ..... N81-14521 #
EPA-600/7-80-155A ..... N81-14519 #
EPA-600/7-80-155B ..... N81-14520 #
EPA-600/7-80-156 ..... N81-14056 #

EPRI-AP-1539-PT-2 ..... N81-14331 #
EPRI-AP-1548 ..... N81-14470 #

EPRI-CS-1444-VOL-3 ..... N81-14478 #
EPRI-CS-1454 ..... N81-14073 #
EPRI-CS-1530 ..... N81-14466 #

EPRI-EA-1538 ..... N81-14514 #

EPRI-EM-1531 ..... N81-14467 #

ESA-CR(P)-1296 ..... N81-14105 #
ESA-CR(P)-1364 ..... N81-13985 #
ESA-CR(P)-1374-VOL-1 ..... N81-14106 #
ESA-CR(P)-1376 ..... N81-14836 #
ESA-CR(P)-1377 ..... N81-14837 #

ESA-SP-1028 ..... N81-14937 #

ESA-TT-680 ..... N81-13952 #

ESD-TR-79-334 ..... N81-13982 #
ESD-TR-80-96 ..... N81-14247 #

ESL-41 ..... N81-14252 #

ESS/SS-997 ..... N81-13985 #

ETI-CR80-770 ..... N81-13978 #

ETL-0228 ..... N81-14661 #
ETL-0233 ..... N81-14663 #
ETL-190227 ..... N81-14378 #

ETMG-117-69 ..... N81-14204 #
ETMG-117-80 ..... N81-14204 #

ETS-54 ..... N81-14247 #

FAA-AFO-500-20 ..... N81-13956 #

FAA-CT-80-18 ..... N81-13945 #
FAA-CT-80-194 ..... N81-14625 #

FAA-EE-80-17 ..... N81-14541* #
FAA-EE-80-32 ..... N81-14756 #

FAA-RD-80-47 ..... N81-13945 #
FAA-RD-80-61 ..... N81-13949 #
FAA-RD-80-67 ..... N81-14555* #
FAA-RD-80-96 ..... N81-14202 #
FAA-RD-80-119 ..... N81-13939 #

FAA-TN-HU-2108 ..... N81-14354 #

FCC/PRB/PDD-80-13 ..... N81-14217 #
FCC/PRB/PDD-80/09 ..... N81-14211 #
FCC/PRB/PDD-80/10 ..... N81-14215 #
FCC/PRB/PDD-80/11 ..... N81-14214 #
FCC/PRB/PDD-80/12 ..... N81-14213 #
FCC/PRB/PDD-80/14 ..... N81-14212 #

FCR-2268 ..... N81-14432 #

FE-1806-72 ..... N81-14332 #
FE-2452-39 ..... N81-14071 #
FE-2468-77 ..... N81-14130 #

FERMILAB-CONF-80/74-THY ..... N81-14549 #

FFA-TN-AU-1661 ..... N81-13925 #

FHWA-PA-72-3-11 ..... N81-14336 #

FOA-C-10148-M3 ..... N81-14375 #
FOA-C-10150-M8 ..... N81-14749 #
FOA-C-10158-M8 ..... N81-14750 #
FOA-C-10160-M8 ..... N81-14751 #
FOA-C-20358-T1 ..... N81-14535 #
FOA-C-30187-E2 ..... N81-14192 #

FPI/R/80/1030 ..... N81-14066 #

FRCR-213 ..... N81-14880 #
FRCR-218 ..... N81-14817 #

FRI-80-AR-87 ..... N81-14582 #

FSU-STATISTICS-M555 ..... N81-14340 #

FUB-15-1979 ..... N81-14193 #
FUB-35-1979 ..... N81-14240 #

GA-A-15863 ..... N81-14833 #
GA-A-15929 ..... N81-14094 #
GA-A-16012 ..... N81-14255 #
GA-A-16052 ..... N81-14832 #

GEPP-TIS-526 ..... N81-14800 #
GEPP-TIS-529 ..... N81-14468 #

GER-16752 ..... N81-14661 #
GER-16753 ..... N81-14378 #

GE80SDS-4230 ..... N81-14283 #

GPO-41-483 ..... N81-14390 #
GPO-50-388 ..... N81-13933 #
GPO-62-143 ..... N81-14926 #

GRI-79/0034 ..... N81-14134 #

GSA/FCSC-80/01 ..... N81-14673 #

GTR-2136 ..... N81-14327 #

GUUS-108003-TR-3 ..... N81-14798 #

GWU-EE-CS-80-09 ..... N81-14381 #

H-1143 ..... N81-14504* #

IAEA-CN-38/A-5 ..... N81-14882 #

ICTS/TR-07 ..... N81-14405 #

IERL-RTP-1079 ..... N81-14519 #
IERL-RTP-1080 ..... N81-14520 #
IERL-RTP-1082 ..... N81-14056 #

IJJP-482 ..... N81-14842 #
IJJP-487 ..... N81-14845 #

INTERIKO-80/1 ..... N81-14290 #

IPF-8-3 ..... N81-14852 #
IPF-80-1 ..... N81-14851 #
IPF-80-2 ..... N81-14298 #
IPF-80-4 ..... N81-14299 #
IPF-80-5 ..... N81-14853 #

IPP-III/55 ..... N81-14298 #

IPPJ-AM-15 ..... N81-14847 #

IPPJ-481 ..... N81-14849 #
IPPJ-483 ..... N81-14841 #
IPPJ-484 ..... N81-14846 #
IPPJ-485 ..... N81-14843 #
IPPJ-486 ..... N81-14844 #

IRT-8199-001 ..... N81-14806 #

ISBN-0-309-03062-5 ..... N81-14182 #
ISBN-0-8330-0248-1 ..... N81-14915* #
ISBN-87-7478-165-0 ..... N81-14537 #
ISBN-87-7478-167-7 ..... N81-14536 #
ISBN-90-6488-003-4 ..... N81-14290 #
ISBN-92-9029-047-1 ..... N81-14405 #
ISBN-951-751-356-9 ..... N81-14935 #
ISBN-951-751-357-7 ..... N81-14578 #
ISBN-951-751-358-5 ..... N81-14190 #
ISBN-951-751-557-X ..... N81-14191 #
ISBN-951-751-558-8 ..... N81-14223 #
ISBN-951-751-702-5 ..... N81-14374 #

ISL-CO-218/79 ..... N81-14300 #
ISL-CO-219/79 ..... N81-14787
ISL-CO-220/79 ..... N81-14292 #

ISS-P-79/13 ..... N81-14850 #

ISS-T-79/11 ..... N81-14632 #

ISSN-SW-0081-5640 ..... N81-13925 #
ISSN-SW-0081-5640 ..... N81-14354 #

ISSN-0071-9196 ..... N81-13980 #
ISSN-0078-3781 ..... N81-13930 #
ISSN-0078-3781 ..... N81-14268 #
ISSN-0080-4371 ..... N81-14941 #
ISSN-0143-733-X ..... N81-14654 #
ISSN-0143-7003 ..... N81-14020 #
ISSN-0143-7003 ..... N81-14021 #
ISSN-0143-7003 ..... N81-14264
ISSN-0143-7143 ..... N81-14792 #
ISSN-0143-7305 ..... N81-14024 #
ISSN-0143-7305 ..... N81-14803 #
ISSN-0143-7348 ..... N81-14025 #
ISSN-0143-7348 ..... N81-14655 #
ISSN-0143-7348 ..... N81-14741 #
ISSN-0309-3050 ..... N81-14026 #
ISSN-0309-3050 ..... N81-14170 #
ISSN-0309-3050 ..... N81-14171 #
ISSN-0340-7608 ..... N81-13996 #
ISSN-0340-7608 ..... N81-14022 #
ISSN-0340-7608 ..... N81-14023 #
ISSN-0340-7608 ..... N81-14058 #
ISSN-0340-7608 ..... N81-14224 #
ISSN-0340-7608 ..... N81-14225 #
ISSN-0340-7608 ..... N81-14226 #
ISSN-0340-7608 ..... N81-14227 #
ISSN-0340-7608 ..... N81-14228 #
ISSN-0340-7608 ..... N81-14229 #
ISSN-0340-7608 ..... N81-14230 #
ISSN-0340-7608 ..... N81-14231 #
ISSN-0340-7608 ..... N81-14232 #
ISSN-0340-7608 ..... N81-14233 #
ISSN-0340-7608 ..... N81-14234 #
ISSN-0340-7608 ..... N81-14235 #
ISSN-0340-7608 ..... N81-14237 #
ISSN-0340-7608 ..... N81-14238 #
ISSN-0340-7608 ..... N81-14239 #
ISSN-0340-7608 ..... N81-14400 #
ISSN-0340-7608 ..... N81-14401 #
ISSN-0340-7608 ..... N81-14402 #
ISSN-0340-7608 ..... N81-14403 #
ISSN-0340-7608 ..... N81-14404 #
ISSN-0340-7608 ..... N81-14407 #
ISSN-0340-7608 ..... N81-14534 #
ISSN-0340-7608 ..... N81-14633 #
ISSN-0340-7608 ..... N81-14634 #
ISSN-0340-7608 ..... N81-14802 #
ISSN-0340-7608 ..... N81-14835 #
ISSN-0340-7608 ..... N81-14854 #
ISSN-0340-7608 ..... N81-14897 #
ISSN-0340-7608 ..... N81-14898 #
ISSN-0340-7608 ..... N81-14918 #
ISSN-0340-7806 ..... N81-14236 #
ISSN-0348-7539 ..... N81-14858 #
ISSN-0348-7539 ..... N81-14859 #
ISSN-0348-7539 ..... N81-14860 #
ISSN-0348-7539 ..... N81-14861 #
ISSN-0348-7644 ..... N81-14855 #
ISSN-0348-7644 ..... N81-14862 #
ISSN-0348-7644 ..... N81-14863 #
ISSN-0348-7644 ..... N81-14864 #
ISSN-0348-7644 ..... N81-14865 #
ISSN-0348-7644 ..... N81-14866 #
ISSN-0348-7644 ..... N81-14867 #
ISSN-0374-2784 ..... N81-14919 #
ISSN-0379-6566 ..... N81-14937 #
ISSN-0390-6469 ..... N81-14850 #
ISSN-0390-6485 ..... N81-14632 #
ISSN-0531-4496 ..... N81-14936 #
ISSN-0547-1567 ..... N81-14848 #
ISSN-0575-4968 ..... N81-14384 #

ISVR-TR-103 ..... N81-14353 #

ITC/S-300580 ..... N81-14609 #

ITR-1 ..... N81-14543 #

JHU/APL/QM-80-101 ..... N81-14499 #
JHU/APL/QM-80-102 ..... N81-14498 #

JPL-PUB-80-67 ..... N81-14372* #
JPL-PUB-80-77-VOL-1 ..... N81-14395* #

JSC-16770 ..... N81-14648* #

KNMI-V-349 ..... N81-14577 #

KNMI-WR-80-6 ..... N81-14189 #

KNMI-108-63 ..... N81-14536 #
KNMI-141-27 ..... N81-14370 #

KNML-WR-80-5 ..... N81-14602 #

L-12774 ..... N81-13918* #
L-13253 ..... N81-13958* #
L-13765 ..... N81-14788* #
L-13826 ..... N81-13919* #
L-13944 ..... N81-13968* #
L-14010 ..... N81-13922* #
L-14017 ..... N81-13915* #
L-14074 ..... N81-14001* #
L-14106 ..... N81-14017* #

LA-UR-80-2160 ..... N81-14621 #
LA-UR-80-2485 ..... N81-14550 #
LA-UR-80-2589 ..... N81-14473 #
LA-UR-80-2673 ..... N81-14050 #
LA-UR-80-2742 ..... N81-14256 #
LA-UR-80-2756 ..... N81-14940 #
LA-UR-80-2787 ..... N81-14938* #

LA-8355 ..... N81-14281 #
LA-8493-MS ..... N81-14341 #
LA-8516-MS ..... N81-14884 #
LA-8531-MS ..... N81-14831 #

LBL-10552 ..... N81-14179 #
LBL-11302 ..... N81-14472 #
LBL-11410 ..... N81-14471 #
LBL-11434 ..... N81-14820 #

LC-14-10563 ..... N81-14184 #
LC-80-18874 ..... N81-14915* #
LC-80-23303 ..... N81-14182 #
LC-80-600106 ..... N81-14644 #

LEHIGH/FL/386-11(80) ..... N81-14336 #

LEMSCO-15182 ..... N81-14648* #

LMSC-D678918 ..... N81-14419 #

L13386 ..... N81-14343* #

M-317 ..... N81-14392* #
M-322 ..... N81-13979* #

MA-RD-940-80098 ..... N81-14183 #

MAE-1486 ..... N81-14107 #

MAKPH-441(80) ..... N81-14110 #
MAKPH-445(80) ..... N81-14109 #

MBB-FE-2/S/PUB-26 ..... N81-14006 #
MBB-FE-17/S/PUB/24 ..... N81-13972 #
MBB-FE-17/S/PUB/25 ..... N81-13973 #
MBB-FE-17/S/PUB/27 ..... N81-13974 #
MBB-FE-122/S/PUB/13 ..... N81-13950 #

MC-BW-115/79 ..... N81-14682 #
MC-BW-116/80 ..... N81-14728 #
MC-BW-117/80 ..... N81-14780 #
MC-BW-118/80 ..... N81-14781 #
MC-BW-122/80 ..... N81-14777 #
MC-BW-123/80 ..... N81-14778 #

MC-IW-117/79 ..... N81-14626 #
MC-IW-118/79 ..... N81-14627 #
MC-IW-120/79 ..... N81-14628 #
MC-IW-121/79 ..... N81-14729 #
MC-IW-122/79 ..... N81-14629 #
MC-IW-123/79 ..... N81-14630 #
MC-IW-124/79 ..... N81-14649 #
MC-IW-125/79 ..... N81-14650 #
MC-IW-126/79 ..... N81-14651 #
MC-IW-128/80 ..... N81-14652 #
MC-IW-129/80 ..... N81-14631 #
MC-IW-130/80 ..... N81-14653 #
MC-IW-138/80 ..... N81-14657 #
MC-IW-141/80 ..... N81-14658 #

MC-NW-73/79 ..... N81-14730 #
MC-NW-74/79 ..... N81-14731 #
MC-NW-75/79 ..... N81-14732 #
MC-NW-76/79 ..... N81-14733 #
MC-NW-77/79 ..... N81-14734 #
MC-NW-78/80 ..... N81-14735 #
MC-NW-80/80 ..... N81-14743 #
MC-NW-84/80 ..... N81-14744 #
MC-NW-86/80 ..... N81-14745 #
MC-NW-87/80 ..... N81-14746 #

MC-SW-67/80 ..... N81-14763 #
MC-SW-68/80 ..... N81-14764 #

MC-TW-190/79 ..... N81-14736 #
MC-TW-192/79 ..... N81-14737 #
MC-TW-193/79 ..... N81-14762 #
MC-TW-194/79 ..... N81-14738 #
MC-TW-195/79 ..... N81-14739 #
MC-TW-196/80 ..... N81-14683 #
MC-TW-197/80 ..... N81-14740 #
MC-TW-202/80 ..... N81-14747 #
MC-TW-203/80 ..... N81-14617 #
MC-TW-204/80 ..... N81-14684 #

MIT-TR-206 ..... N81-13986 #

MIT/LMP/TRB-80-2 ..... N81-14064 #

MLM-2770(OP) ..... N81-14409 #
MLM-2774 ..... N81-14051 #

MLR-923 ..... N81-13995 #

MML-TR-80-38C ..... N81-14870 #

MQAD-TP-727 ..... N81-14338 #

MRC-DA-921 ..... N81-14521 #

MRC-R-548 ..... N81-14539 #

MSRR-463 ..... N81-14916 #
MSRR-464 ..... N81-14768 #

NAC/FR-303-B/01 ..... N81-14202 #

NADC-78187-60 ..... N81-13961 #

NAEC-92-114 ..... N81-13953 #

NASA-CASE-ARC-11114-1 ..... N81-14605*
NASA-CASE-ARC-11117-1 ..... N81-14612*
NASA-CASE-ARC-11118-2 ..... N81-14613*
NASA-CASE-ARC-11174-1 ..... N81-13999*
NASA-CASE-ARC-11241-1 ..... N81-14016*

NASA-CASE-GSC-12411-1 ..... N81-14221*
NASA-CASE-GSC-12429-1 ..... N81-14320*

NASA-CASE-KSC-11064-1 ..... N81-14137*

NASA-CASE-LAR-11855-1 ..... N81-14319*
NASA-CASE-LAR-12054-2 ..... N81-14078*
NASA-CASE-LAR-12065-1 ..... N81-14000*

NASA-CASE-LEW-12081-3 ..... N81-14103*

NASA-CASE-MSC-12631-3 ..... N81-14077*
NASA-CASE-MSC-16800-1 ..... N81-14187*
NASA-CASE-MSC-16973-1 ..... N81-14317*

NASA-CASE-NPO-14001-1 ..... N81-14076*
NASA-CASE-NPO-14143-1 ..... N81-14015*
NASA-CASE-NPO-14163-1 ..... N81-14220*
NASA-CASE-NPO-14220-1 ..... N81-14318*
NASA-CASE-NPO-14416-1 ..... N81-14389*
NASA-CASE-NPO-14513-1 ..... N81-14287*
NASA-CASE-NPO-14536-1 ..... N81-14185*
NASA-CASE-NPO-14749-1 ..... N81-14186*

NASA-CP-2139 ..... N81-14555* #
NASA-CP-2150 ..... N81-14138* #
NASA-CP-2165 ..... N81-14944* #
NASA-CP-2166 ..... N81-14690* #

NASA-CR-3226 ..... N81-14347* #
NASA-CR-3311 ..... N81-13923* #
NASA-CR-3350 ..... N81-14392* #
NASA-CR-3352 ..... N81-13920* #
NASA-CR-3356 ..... N81-14337* #
NASA-CR-3364 ..... N81-14646* #
NASA-CR-3380 ..... N81-13993* #
NASA-CR-150800 ..... N81-14222* #
NASA-CR-156872 ..... N81-14601* #
NASA-CR-159328 ..... N81-13941* #
NASA-CR-159374 ..... N81-14554* #
NASA-CR-159678 ..... N81-14082* #
NASA-CR-159880 ..... N81-14391* #
NASA-CR-160885 ..... N81-14624* #
NASA-CR-160889 ..... N81-14648* #
NASA-CR-160891 ..... N81-14615* #
NASA-CR-160893 ..... N81-14614* #
NASA-CR-160894 ..... N81-14288* #
NASA-CR-160895 ..... N81-14018* #
NASA-CR-161595 ..... N81-14393* #
NASA-CR-161603 ..... N81-14394* #
NASA-CR-163097 ..... N81-13969* #
NASA-CR-163103 ..... N81-14504* #
NASA-CR-163820 ..... N81-14219* #
NASA-CR-163822 ..... N81-14365* #
NASA-CR-163824 ..... N81-14789* #
NASA-CR-163825 ..... N81-14372* #
NASA-CR-163826 ..... N81-14395* #
NASA-CR-163827 ..... N81-14914* #
NASA-CR-163828 ..... N81-14266* #
NASA-CR-163829 ..... N81-14801* #
NASA-CR-163830 ..... N81-14388* #
NASA-CR-163831 ..... N81-14314* #
NASA-CR-163832 ..... N81-14313* #
NASA-CR-163833 ..... N81-13957* #
NASA-CR-163834 ..... N81-14315* #
NASA-CR-163835 ..... N81-14316* #
NASA-CR-163836 ..... N81-14623* #
NASA-CR-163837 ..... N81-13917* #
NASA-CR-163838 ..... N81-13946* #
NASA-CR-163839 ..... N81-14943* #
NASA-CR-163840 ..... N81-14491* #
NASA-CR-163841 ..... N81-14531* #
NASA-CR-165162 ..... N81-13963* #
NASA-CR-165196 ..... N81-14267* #

NASA-SP-7011(212) N81-14611*
NASA-SP-7037(128) N81-13914*
NASA-SP-7041(27) N81-14371*

NASA-TM-78308 ..... N81-13979* #
NASA-TM-78314 ..... N81-14552* #
NASA-TM-78315 ..... N81-14553* #
NASA-TM-78317 ..... N81-14530* #
NASA-TM-80064 ..... N81-13959* #
NASA-TM-80080 ..... N81-13918* #
NASA-TM-80216 ..... N81-14002* #
NASA-TM-81248 ..... N81-14265* #
NASA-TM-81253 ..... N81-14606* #
NASA-TM-81594 ..... N81-14396* #
NASA-TM-81612 ..... N81-14399* #
NASA-TM-81640 ..... N81-14398* #
NASA-TM-81658 ..... N81-14397* #
NASA-TM-81862 ..... N81-13921* #
NASA-TM-81865 ..... N81-13922* #
NASA-TM-81887 ..... N81-13992* #
NASA-TM-81899 ..... N81-14346* #
NASA-TM-81901 ..... N81-14345* #
NASA-TM-81916 ..... N81-14790* #
NASA-TM-81917 ..... N81-14081* #
NASA-TM-81918 ..... N81-14080* #
NASA-TM-82223 ..... N81-14532* #
NASA-TM-82228 ..... N81-14508* #
NASA-TM-82229 ..... N81-14938* #
NASA-TM-82230 ..... N81-14303* #
NASA-TM-82231 ..... N81-14304* #
NASA-TM-82389 ..... N81-13990* #
NASA-TM-82390 ..... N81-13991* #

NASA-TP-1731 ..... N81-14322* #
NASA-TP-1736 ..... N81-13958* #
NASA-TP-1747 ..... N81-14788* #
NASA-TP-1756 ..... N81-14079* #
NASA-TP-1760 ..... N81-13968* #
NASA-TP-1775 ..... N81-14343* #
NASA-TP-1784 ..... N81-13919* #
NASA-TP-1787 ..... N81-13915* #
NASA-TP-1794 ..... N81-14017* #
NASA-TP-1795 ..... N81-14001* #

NAVSEA-MT-S-475-77 ..... N81-14199 #

NAVTRAEQUIPC-IH-318 ..... N81-14923 #

NBS-HB-44-1979 ..... N81-14181 #
NBS-HB-44-1980 ..... N81-14184 #

NBS-SP-500-62 ..... N81-14644 #

NBS-TN-1115 ..... N81-14913 #
NBS-TN-1126 ..... N81-14672 #
NBS-TN-1130 ..... N81-14133 #

NBSIR-78-1453 ..... N81-14133 #
NBSIR-80-2028 ..... N81-14501 #
NBSIR-80-2047 ..... N81-14095 #
NBSIR-80-2061 ..... N81-14261 #
NBSIR-80-2115 ..... N81-14643 #

NEL-666 ..... N81-14270 #

NEPRF-CR-80-03 ..... N81-14579 #

NEPRF-TR-80-02 ..... N81-14583 #
NEPRF-TR-80-03 ..... N81-13989 #

NOAA-DR-ERL-GLERL-16 ..... N81-14387 #

NOAA-NWS-CRCP-1 ..... N81-14599 #

NOAA-TM-ERL-WPL-53 ..... N81-14600 #

NOAA-TM-NWS-NHC-13 ..... N81-14598 #

NOAA-TM-NWS-SR-100 ..... N81-14595 #
NOAA-TM-NWS-SR-101 ..... N81-14596 #

NOAA-TM-NWS-WR-153 ..... N81-14597 #

NOAA-TR-OOE-9 ..... N81-14500 #

NOAA-80071701 ..... N81-14600 #
NOAA-80071704 ..... N81-14500 #
NOAA-80071705 ..... N81-14387 #
NOAA-80072802 ..... N81-14603 #
NOAA-80073103 ..... N81-14598 #
NOAA-80073104 ..... N81-14596 #
NOAA-80073105 ..... N81-14595 #
NOAA-80073106 ..... N81-14597 #

NOSC/TD-352-VOL-1 ..... N81-14201 #

NOSC/TR-499 ..... N81-14199 #
NOSC/TR-580 ..... N81-14584 #
NOSC/TR-582 ..... N81-14205 #

NPL-AC-93 ..... N81-14792 #
NPL-AC-94 ..... N81-14616 #

NPL-CHEM-104 ..... N81-14020 #
NPL-CHEM-106 ..... N81-14264
NPL-CHEM-107 ..... N81-14021 #

NPL-CSU-7/80 ..... N81-14654 #

NPL-DES-59 ..... N81-14803 #
NPL-DES-64 ..... N81-14024 #

NPL-DNACS-28/80 ..... N81-14025 #
NPL-DNACS-29/80 ..... N81-14741 #
NPL-DNACS-30/80 ..... N81-14655 #

NPL-MOM-42 ..... N81-14308 #

NPL-QU-54 ..... N81-14026 #
NPL-QU-57 ..... N81-14170 #
NPL-QU-58 ..... N81-14171 #
NPL-QU-59 ..... N81-14505 #

NRL-MR-4303 ..... N81-14246 #
NRL-MR-4342 ..... N81-14383 #
NRL-MR-4357 ..... N81-14250 #
NRL-MR-4364 ..... N81-14293 #
NRL-MR-4365 ..... N81-14036 #

NRL-8436 ..... N81-14581 #
NRL-8437 ..... N81-14065 #
NRL-8438 ..... N81-14636 #
NRL-8443 ..... N81-14206 #
NRL-8454 ..... N81-14376 #

NSF/RA-800151 ..... N81-14609 #
NSF/RA-800187 ..... N81-14135 #

NSSDC-80-05 ..... N81-14532* #

NTHD-123 ..... N81-14351 #

NTIS/CR-80-8 ..... N81-14216 #

NTIS/PS-78/0666 ..... N81-14497 #
NTIS/PS-78/0667 ..... N81-14495 #
NTIS/PS-78/0731 ..... N81-13948 #
NTIS/PS-78/0732 ..... N81-13947 #
NTIS/PS-78/0733 ..... N81-14209 #
NTIS/PS-78/0734 ..... N81-14210 #
NTIS/PS-78/0816 ..... N81-14100 #
NTIS/PS-78/0817 ..... N81-14102 #
NTIS/PS-78/0818 ..... N81-14101 #
NTIS/PS-78/0819 ..... N81-14099 #
NTIS/PS-78/0821 ..... N81-14258 #
NTIS/PS-78/0822 ..... N81-14259 #
NTIS/PS-78/0824 ..... N81-14286 #
NTIS/PS-78/0836 ..... N81-14494 #
NTIS/PS-78/0837 ..... N81-14493 #
NTIS/PS-78/0852 ..... N81-14310 #
NTIS/PS-78/0853 ..... N81-14309 #
NTIS/PS-78/0865 ..... N81-14136 #
NTIS/PS-78/0872 ..... N81-14311 #
NTIS/PS-78/0873 ..... N81-14218 #
NTIS/PS-78/0878 ..... N81-14679 #
NTIS/PS-78/0879 ..... N81-14297 #
NTIS/PS-78/0925 ..... N81-14689 #
NTIS/PS-78/0930 ..... N81-14525 #
NTIS/PS-78/0932 ..... N81-14677 #
NTIS/PS-78/0947 ..... N81-14097 #
NTIS/PS-78/0948 ..... N81-14096 #
NTIS/PS-78/0966 ..... N81-14057 #
NTIS/PS-78/0984 ..... N81-14335 #
NTIS/PS-79/0506 ..... N81-14623* #
NTIS/PS-79/0732 ..... N81-14388* #
NTIS/PS-79/0760 ..... N81-14209 #
NTIS/PS-79/0761 ..... N81-14210 #
NTIS/PS-79/0777 ..... N81-13948 #
NTIS/PS-79/0778 ..... N81-13947 #
NTIS/PS-79/0817 ..... N81-14497 #
NTIS/PS-79/0819 ..... N81-14495 #
NTIS/PS-79/0825 ..... N81-13946* #
NTIS/PS-79/0852 ..... N81-14286 #
NTIS/PS-79/0853 ..... N81-14100 #
NTIS/PS-79/0854 ..... N81-14102 #
NTIS/PS-79/0855 ..... N81-14101 #
NTIS/PS-79/0856 ..... N81-14099 #
NTIS/PS-79/0859/3 ..... N81-13917* #
NTIS/PS-79/0861/9 ..... N81-14314* #
NTIS/PS-79/0862/7 ..... N81-14316* #
NTIS/PS-79/0863/5 ..... N81-14315* #
NTIS/PS-79/0870 ..... N81-14258 #
NTIS/PS-79/0871 ..... N81-14259 #
NTIS/PS-79/0879 ..... N81-14679 #
NTIS/PS-79/0890 ..... N81-14310 #
NTIS/PS-79/0891 ..... N81-14309 #
NTIS/PS-79/0894 ..... N81-14311 #
NTIS/PS-79/0909 ..... N81-14297 #
NTIS/PS-79/0913 ..... N81-14136 #
NTIS/PS-79/0924 ..... N81-14494 #
NTIS/PS-79/0925 ..... N81-14493 #
NTIS/PS-79/0933 ..... N81-14689 #
NTIS/PS-79/0973 ..... N81-14525 #
NTIS/PS-79/0998 ..... N81-14218 #
NTIS/PS-79/1017 ..... N81-13957* #
NTIS/PS-79/1018 ..... N81-14219* #
NTIS/PS-79/1019 ..... N81-14677 #
NTIS/PS-79/1025 ..... N81-14057 #
NTIS/PS-79/1028 ..... N81-14335 #
NTIS/PS-79/1032 ..... N81-14096 #
NTIS/PS-79/1034 ..... N81-14097 #
NTIS/PS-79/1063 ..... N81-14262 #

NUSC-TR-6327 ..... N81-14767 #

NVO-196-17 ..... N81-14830 #

NWC-TP-6164 ..... N81-14244 #
NWC-TP-6184 ..... N81-14084 #
NWC-TP-6198 ..... N81-14339 #
NWC-TP-6218 ..... N81-13938 #

ONERA-NT-1980-4 ..... N81-13930 #
ONERA-NT-1980-4 ..... N81-14268 #

OPD-TR-80-202-02 ..... N81-14922 #

ORNL/CON-50 ..... N81-14282 #

ORNL/CSD-61 ..... N81-14760 #

ORNL/CSD/TM-128 ..... N81-14670 #

ORNL/TM-6830/P9 ..... N81-14474 #

ORNL/TM-7140 ..... N81-14513 #
ORNL/TM-7153 ..... N81-14885 #
ORNL/TM-7156 ..... N81-14925 #
ORNL/TM-7339 ..... N81-14886 #
ORNL/TM-7355 ..... N81-14296 #
ORNL/TM-7437 ..... N81-14887 #
ORNL/TM-7503 ..... N81-14888 #

ORO-3948-12 ..... N81-14814 #

OSD-TR-80-202-01 ..... N81-14921 #

OWRT-A-046-TEX(1) ..... N81-14934 #
OWRT-A-999-CAL(16) ..... N81-14384 #

OWRT-B-056-ARK(1) ..... N81-14524 #

PB80-212806 ..... N81-14386 #
PB80-213226 ..... N81-14181 #
PB80-213549 ..... N81-14095 #
PB80-213622 ..... N81-14184 #
PB80-213978 ..... N81-14551 #
PB80-215338 ..... N81-14644 #
PB80-215536 ..... N81-14133 #
PB80-215544 ..... N81-13916 #
PB80-215635 ..... N81-14182 #
PB80-215759 ..... N81-14211 #
PB80-215767 ..... N81-14215 #
PB80-215775 ..... N81-14214 #
PB80-215783 ..... N81-14213 #
PB80-215791 ..... N81-14212 #
PB80-215932 ..... N81-14217 #
PB80-216013 ..... N81-14610 #
PB80-216161 ..... N81-14519 #
PB80-216179 ..... N81-14520 #
PB80-216211 ..... N81-14642 #
PB80-216641 ..... N81-14135 #
PB80-216765 ..... N81-14518 #
PB80-216914 ..... N81-14913 #
PB80-216922 ..... N81-14055 #
PB80-217490 ..... N81-14498 #
PB80-217607 ..... N81-14600 #
PB80-217615 ..... N81-14501 #
PB80-217623 ..... N81-14261 #
PB80-218159 ..... N81-14500 #
PB80-218217 ..... N81-14336 #
PB80-218233 ..... N81-13949 #
PB80-218282 ..... N81-14134 #
PB80-218308 ..... N81-14387 #
PB80-218613 ..... N81-14056 #
PB80-218753 ..... N81-14216 #
PB80-219116 ..... N81-14054 #
PB80-219124 ..... N81-14385 #
PB80-219777 ..... N81-14672 #
PB80-219868 ..... N81-14675 #
PB80-219876 ..... N81-14676 #
PB80-219926 ..... N81-14671 #
PB80-219934 ..... N81-14674 #
PB80-220239 ..... N81-14053 #
PB80-221088 ..... N81-14499 #
PB80-221161 ..... N81-14934 #
PB80-221781 ..... N81-14609 #
PB80-221997 ..... N81-14183 #
PB80-222029 ..... N81-14673 #
PB80-222250 ..... N81-14524 #
PB80-222276 ..... N81-14384 #
PB80-224058 ..... N81-14522 #
PB80-225204 ..... N81-14643 #
PB80-225311 ..... N81-14523 #
PB80-225568 ..... N81-14603 #
PB80-225576 ..... N81-14596 #
PB80-225584 ..... N81-14595 #
PB80-225592 ..... N81-14597 #
PB80-225675 ..... N81-14599 #
PB80-225691 ..... N81-13956 #
PB80-226046 ..... N81-14604 #
PB80-226301 ..... N81-14598 #
PB80-226665 ..... N81-14521 #
PB80-808868 ..... N81-14075 #
PB80-813801 ..... N81-14312 #
PB80-813819 ..... N81-14311 #
PB80-814007 ..... N81-14260 #
PB80-814015 ..... N81-14679 #
PB80-814023 ..... N81-14623* #
PB80-814163 ..... N81-14136 #
PB80-814171 ..... N81-14285 #
PB80-814189 ..... N81-14286 #
PB80-814262 ..... N81-14209 #
PB80-814270 ..... N81-14210 #
PB80-814288 ..... N81-14297 #

PB80-814296 ..... N81-14258 #
PB80-814304 ..... N81-14259 #
PB80-814395 ..... N81-14689 #
PB80-814411 ..... N81-14526 #
PB80-814437 ..... N81-14309 #
PB80-814445 ..... N81-14310 #
PB80-814452 ..... N81-14493 #
PB80-814460 ..... N81-14494 #
PB80-814635 ..... N81-13948 #
PB80-814643 ..... N81-13947 #
PB80-814676 ..... N81-14497 #
PB80-814684 ..... N81-14496 #
PB80-814692 ..... N81-14495 #
PB80-815053 ..... N81-14057 #
PB80-815129 ..... N81-14645 #
PB80-815202 ..... N81-14335 #
PB80-815319 ..... N81-14218 #
PB80-815491 ..... N81-14677 #
PB80-815566 ..... N81-14525 #
PB80-815574 ..... N81-14098 #
PB80-815582 ..... N81-14097 #
PB80-815590 ..... N81-14096 #
PB80-815632 ..... N81-14388* #
PB80-815640 ..... N81-13946* #
PB80-815665 ..... N81-14100 #
PB80-815673 ..... N81-14101 #
PB80-815681 ..... N81-14102 #
PB80-815863 ..... N81-14314* #
PB80-815871 ..... N81-14313* #
PB80-815897 ..... N81-14316* #
PB80-815905 ..... N81-13917* #
PB80-815913 ..... N81-14315* #
PB80-815962 ..... N81-14219* #
PB80-815970 ..... N81-13957* #
PB80-816010 ..... N81-14099 #
PB80-816028 ..... N81-14262 #

PLP-810 ..... N81-14895 #

PNL-SA-8049 ..... N81-14131 #

PNL-2720 ..... N81-14883 #
PNL-3200 ..... N81-14464 #
PNL-3344 ..... N81-14072 #
PNL-3492 ..... N81-14929 #

PNR-90024 ..... N81-14004 #
PNR-90025 ..... N81-14271 #
PNR-90026 ..... N81-14172 #
PNR-90027 ..... N81-14173 #
PNR-90029 ..... N81-14793 #
PNR-90030 ..... N81-14794 #
PNR-90032 ..... N81-14795 #
PNR-90034 ..... N81-13964 #
PNR-90035 ..... N81-14349 #
PNR-90036 ..... N81-13962

PPPL-1707 ..... N81-14889 #

PR-2 ..... N81-14818 #
PR-4 ..... N81-14431 #
PR-23 ..... N81-14760 #

PSR-1028 ..... N81-14196 #

PUB-204 ..... N81-14350 #

PUR-90028 ..... N81-14174 #

PWA-FR-13036A ..... N81-14325 #

QR-1 ..... N81-14433 #
QR-1 ..... N81-14482 #
QR-2 ..... N81-14419 #
QR-4 ..... N81-14440 #
QR-5 ..... N81-14068 #
QR-8/9 ..... N81-14203 #

QTPR-2 ..... N81-14432 #
QTPR-3 ..... N81-14443 #

R-2619-RC ..... N81-14915* #

RAD-80-202-187-54-23 ..... N81-14519 #
RAD-80-202-187-54-23 ..... N81-14520 #

RADC-TR-76-101-VOL-8 ..... N81-14200 #
RADC-TR-80-257 ..... N81-14249 #
RADC-TR-80-275 ..... N81-14198 #
RADC-TR-80-293 ..... N81-14666 #

RAE-LIB-TRANS-2045 ..... N81-14003 #

RAE-SPACE-582 ..... N81-13981 #

RAE-TM-MAT-347 ..... N81-14007 #

RAE-TR-80085 ..... N81-13981 #

REPT-S-108 ..... N81-14935 #
REPT-S-109 ..... N81-14578 #
REPT-S-110 ..... N81-14190 #
REPT-S-111 ..... N81-14191 #
REPT-S-112 ..... N81-14223 #
REPT-S-113 ..... N81-14374 #

REPT-3 ..... N81-14293 #
REPT-48 ..... N81-14384 #
REPT-80-1 ..... N81-14662 #
REPT-80-9D9-HYTEM-R1 ..... N81-14068 #
REPT-80-07-04 ..... N81-14920 #
REPT-80-122 ..... N81-14868 #
REPT-677 ..... N81-14351 #
REPT-679 ..... N81-14352 #
REPT-1067-2.3 ..... N81-14660 #
REPT-1980-03-11 ..... N81-14533 #

RFP-3121/3533/80/8 ..... N81-14476 #
RFP-3126/3533/80/2 ..... N81-14475 #

RIF-2C1779 ..... N81-14240 #
RIF-3C0779 ..... N81-14193 #

RLO-2434-8 ..... N81-14257 #

RM-80-06 ..... N81-14774 #

ROG-13 ..... N81-14941 #

RPDL-80-14 ..... N81-14822 #

RR-80-2 ..... N81-14765 #
RR-115 ..... N81-14776 #
RR-117 ..... N81-14779 #
RR-118 ..... N81-14748 #
RR-120 ..... N81-14685 #

R80-AEG049 ..... N81-13965 #

S-508 ..... N81-14138* #

SAI-80-018-CP ..... N81-14134 #
SAI-81-179-WA ..... N81-14921 #
SAI-81-195-WA ..... N81-14922 #
SAI-181-EF80-156 ..... N81-14504* #

SAM-TR-79-33 ..... N81-14038 #
SAM-TR-79-38 ..... N81-14687 #
SAM-TR-80-10 ..... N81-14035 #
SAM-TR-80-13 ..... N81-14032 #
SAM-TR-80-26 ..... N81-14620 #
SAM-TR-80-29 ..... N81-13966 #

SAND-74-0255B ..... N81-14506 #
SAND-78-7040/2 ..... N81-14416 #
SAND-79-1010 ..... N81-14410 #
SAND-79-1027 ..... N81-14823 #
SAND-79-1541C ..... N81-14039 #
SAND-79-1770 ..... N81-14928 #
SAND-79-2130 ..... N81-14506 #
SAND-79-2154C ..... N81-14414 #
SAND-79-2155 ..... N81-14413 #
SAND-79-2155C ..... N81-14901 #
SAND-79-2190 ..... N81-14412 #
SAND-79-2245 ..... N81-14927 #
SAND-79-2313 ..... N81-14640 #
SAND-79-2417 ..... N81-14013 #
SAND-79-2422 ..... N81-14415 #
SAND-80-0039 ..... N81-14277 #
SAND-80-0081 ..... N81-14040 #
SAND-80-0231 ..... N81-14112 #
SAND-80-0475 ..... N81-14417 #
SAND-80-0655 ..... N81-14758 #
SAND-80-0688 ..... N81-14357 #
SAND-80-0702C ..... N81-14411 #
SAND-80-0821 ..... N81-14678 #
SAND-80-0881 ..... N81-14356 #
SAND-80-0891 ..... N81-14639 #
SAND-80-1121 ..... N81-14355 #
SAND-80-1230C ..... N81-14807 #
SAND-80-1260 ..... N81-14757 #

SAND-80-1286 ..... N81-14294 #

SAR-2 ..... N81-14492 #

SATR-3 ..... N81-14899 #

SC5202.9SA ..... N81-14899 #

SDL-79-6501 ..... N81-14302 #

SER-A-89-MITT-155 ..... N81-13980 #

SERI/CP-354-421 ..... N81-14481 #

SERI/PR-9131-1-T1 ..... N81-14482 #

SERI/TP-641-773 ..... N81-14483 #

SEVILLE-TR-78-01 ..... N81-14625 #

SI-ER-915-8/9 ..... N81-14200 #

SPC-615 ..... N81-13954 #

SR-2 ..... N81-14580 #
SR-3 ..... N81-14540 #

SRD-79-148-1-VOL-1 ..... N81-14484 #
SRD-79-148-2 ..... N81-14485 #
SRD-79-148-3 ..... N81-14486 #
SRD-80-111 ..... N81-14008 #

SRL-9799 ..... N81-14061 #

SR80-R-4981-04 ..... N81-14092 #

SU-IPR-819 ..... N81-14943* #

SU-STAN-CS-80-779 ..... N81-14665 #

SU-TR-26 ..... N81-14215 #
SU-TR-27 ..... N81-14214 #
SU-TR-28 ..... N81-14517 #
SU-TR-29 ..... N81-14211 #
SU-TR-30 ..... N81-14213 #

SVHSER-7221 ..... N81-14624* #

TB-145 ..... N81-14003 #

TDB-343 ..... N81-14919 #
TDB-347 ..... N81-14834 #
TDB-350 ..... N81-14291 #

TN-1980-39 ..... N81-14924 #

TPR-2 ..... N81-14253 #
TPR-2 ..... N81-14441 #

TPS-79-752 ..... N81-14470 #

TR-D48 ..... N81-14340 #

TR-7 ..... N81-14085 #
TR-7 ..... N81-14805 #
TR-9 ..... N81-14248 #
TR-13 ..... N81-14037 #
TR-14 ..... N81-14900 #
TR-32 ..... N81-14011 #
TR-36 ..... N81-14033 #
TR-80-5 ..... N81-13997 #
TR-80-388200-2 ..... N81-14669 #
TR-113-3 ..... N81-14668 #
TR-139 ..... N81-14769 #
TR-140 ..... N81-14785 #
TR-141 ..... N81-14784 #
TR-801 ..... N81-14659 #
TR-948 ..... N81-14664 #

TRB/TRR-752 ..... N81-14182 #

TRITA-EPP-79-14 ..... N81-14856 #
TRITA-EPP-79-19 ..... N81-14942 #
TRITA-EPP-79-20 ..... N81-14857 #
TRITA-EPP-79-21 ..... N81-14858 #
TRITA-EPP-79-22 ..... N81-14859 #
TRITA-EPP-80-02 ..... N81-14860 #
TRITA-EPP-80-03 ..... N81-14861 #

TRITA-HFL-0024 ..... N81-14350 #

TRITA-HFL-0026 ..... N81-14323 #

TRITA-NA-8001 ..... N81-14783 #
TRITA-NA-8003 ..... N81-14656 #
TRITA-NA-8004 ..... N81-14742 #

TRITA-PFU-80-03 ..... N81-14863 #
TRITA-PFU-80-04 ..... N81-14864 #
TRITA-PFU-80-05 ..... N81-14865 #
TRITA-PFU-80-06 ..... N81-14855 #
TRITA-PFU-80-07 ..... N81-14866 #
TRITA-PFU-80-08 ..... N81-14867 #

TRITA-80-02 ..... N81-14862 #

TSC-PD-B612-3 ..... N81-14518 #

TT-674 ..... N81-13928 #
TT-677 ..... N81-14195 #
TT-683 ..... N81-13943 #
TT-686 ..... N81-14622 #

UAH-RR-257 ..... N81-14086 #

UCAR-10042-80 ..... N81-14892 #

UCB/ERL-468 ..... N81-14245 #

UCID-18681 ..... N81-14911 #
UCID-18776 ..... N81-14487 #
UCID-18785 ..... N81-14132 #
UCID-18802 ..... N81-14894 #

UCRL-15290-VOL-1 ..... N81-14484 #
UCRL-15290-VOL-2 ..... N81-14485 #
UCRL-15290-VOL-3 ..... N81-14486 #
UCRL-52960-1 ..... N81-14333 #
UCRL-52960-4 ..... N81-14334 #
UCRL-84235 ..... N81-14893 #
UCRL-84273 ..... N81-14052 #
UCRL-84478 ..... N81-14074 #
UCRL-84547 ..... N81-14594 #
UCRL-85033 ..... N81-14891 #

UILU-ENG-80-1721 ..... N81-14759 #

UIUCDCS-R-80-1019 ..... N81-14759 #

UMASS-ARF-80-309 ..... N81-14540 #

US-PATENT-APPL-SN-003693 ..... N81-14612*
US-PATENT-APPL-SN-006952 ..... N81-14077*
US-PATENT-APPL-SN-009887 ..... N81-14103*
US-PATENT-APPL-SN-009888 ..... N81-14320*
US-PATENT-APPL-SN-011737 ..... N81-14078*
US-PATENT-APPL-SN-014664 ..... N81-14389*
US-PATENT-APPL-SN-025162 ..... N81-14287*
US-PATENT-APPL-SN-037066 ..... N81-14016*
US-PATENT-APPL-SN-078521 ..... N81-14186*
US-PATENT-APPL-SN-568541 ..... N81-14077*
US-PATENT-APPL-SN-676432 ..... N81-14103*
US-PATENT-APPL-SN-771245 ..... N81-14076*
US-PATENT-APPL-SN-785279 ..... N81-14077*
US-PATENT-APPL-SN-837794 ..... N81-14103*
US-PATENT-APPL-SN-839963 ..... N81-14078*
US-PATENT-APPL-SN-850504 ..... N81-14613*
US-PATENT-APPL-SN-878541 ..... N81-14220*
US-PATENT-APPL-SN-889671 ..... N81-14000*
US-PATENT-APPL-SN-897840 ..... N81-14137*
US-PATENT-APPL-SN-907421 ..... N81-14318*
US-PATENT-APPL-SN-929086 ..... N81-13999*
US-PATENT-APPL-SN-938297 ..... N81-14015*
US-PATENT-APPL-SN-951422 ..... N81-14605*
US-PATENT-APPL-SN-953313 ..... N81-14187*
US-PATENT-APPL-SN-953314 ..... N81-14319*
US-PATENT-APPL-SN-965367 ..... N81-14221*
US-PATENT-APPL-SN-969756 ..... N81-14317*
US-PATENT-APPL-SN-974471 ..... N81-14185*
US-PATENT-APPL-SN-974476 ..... N81-14613*

US-PATENT-CLASS-29-DIG.1 ..... N81-14389*
US-PATENT-CLASS-29-832 ..... N81-14389*
US-PATENT-CLASS-44.7R N81-14103*
US-PATENT-CLASS-52-232 ..... N81-14317*
US-PATENT-CLASS-52-743 ..... N81-14317*
US-PATENT-CLASS-55-2 ..... N81-14103*
US-PATENT-CLASS-60-518 ..... N81-14318*
US-PATENT-CLASS-62-12 ..... N81-14103*
US-PATENT-CLASS-62-18 ..... N81-14103*
US-PATENT-CLASS-62-45 ..... N81-14103*
US-PATENT-CLASS-62-47 ..... N81-14103*
US-PATENT-CLASS-62-514R N81-14287*
US-PATENT-CLASS-74-417 ..... N81-14318*
US-PATENT-CLASS-82-1.2 ..... N81-14319*
US-PATENT-CLASS-82-1C N81-14319*
US-PATENT-CLASS-82-36R N81-14319*
US-PATENT-CLASS-128-DIG.6 ..... N81-14605*
US-PATENT-CLASS-128-DIG.9 ..... N81-14605*
US-PATENT-CLASS-128-DIG.12 ..... N81-14605*
US-PATENT-CLASS-128-DIG.16 ..... N81-14605*
US-PATENT-CLASS-128-DIG.26 ..... N81-14605*
US-PATENT-CLASS-128-204.18 ..... N81-14605*
US-PATENT-CLASS-128-207.14 ..... N81-14605*
US-PATENT-CLASS-128-207.28 ..... N81-14605*
US-PATENT-CLASS-128-236 ..... N81-14605*
US-PATENT-CLASS-128-642 ..... N81-14612*
US-PATENT-CLASS-149-1 ..... N81-14103*
US-PATENT-CLASS-150-11 ..... N81-14317*
US-PATENT-CLASS-156-154 ..... N81-14077*
US-PATENT-CLASS-156-160 ..... N81-14077*
US-PATENT-CLASS-156-163 ..... N81-14077*
US-PATENT-CLASS-156-212 ..... N81-14077*
US-PATENT-CLASS-156-267 ..... N81-14077*
US-PATENT-CLASS-156-294 ..... N81-14317*
US-PATENT-CLASS-156-295 ..... N81-14077*
US-PATENT-CLASS-156-323 ..... N81-14077*
US-PATENT-CLASS-156-330 ..... N81-14000*
US-PATENT-CLASS-156-331 ..... N81-14077*
US-PATENT-CLASS-156-344 ..... N81-14103*
US-PATENT-CLASS-165-105 ..... N81-14287*
US-PATENT-CLASS-169-62 ..... N81-14137*
US-PATENT-CLASS-169-70 ..... N81-14137*
US-PATENT-CLASS-210-24R N81-14076*
US-PATENT-CLASS-244-161 ..... N81-14320*
US-PATENT-CLASS-250-343 ..... N81-14015*
US-PATENT-CLASS-260-2.1E N81-14076*
US-PATENT-CLASS-260-17.2 ..... N81-13999*
US-PATENT-CLASS-260-17A N81-14076*
US-PATENT-CLASS-260-33.8F N81-14016*
US-PATENT-CLASS-260-858 ..... N81-14076*
US-PATENT-CLASS-260-886 ..... N81-14076*
US-PATENT-CLASS-260-895 ..... N81-14076*
US-PATENT-CLASS-260-898 ..... N81-14076*
US-PATENT-CLASS-260-901 ..... N81-14076*
US-PATENT-CLASS-260-8900 ..... N81-14076*
US-PATENT-CLASS-264-137 ..... N81-14078*
US-PATENT-CLASS-294-106 ..... N81-14320*
US-PATENT-CLASS-340-309.4 ..... N81-14221*
US-PATENT-CLASS-340-310A N81-14221*
US-PATENT-CLASS-340-310R N81-14221*
US-PATENT-CLASS-340-870.24 ..... N81-14221*
US-PATENT-CLASS-343-100TD N81-14185*
US-PATENT-CLASS-343-727 ..... N81-14187*
US-PATENT-CLASS-343-789 ..... N81-14187*
US-PATENT-CLASS-343-797 ..... N81-14187*
US-PATENT-CLASS-356-437 ..... N81-14015*
US-PATENT-CLASS-363-56 ..... N81-14220*
US-PATENT-CLASS-363-71 ..... N81-14220*
US-PATENT-CLASS-363-78 ..... N81-14220*
US-PATENT-CLASS-368-47 ..... N81-14221*
US-PATENT-CLASS-370-85 ..... N81-14221*
US-PATENT-CLASS-375-107 ..... N81-14186*
US-PATENT-CLASS-407-85 ..... N81-14319*
US-PATENT-CLASS-407-117 ..... N81-14319*
US-PATENT-CLASS-408-1R N81-14319*
US-PATENT-CLASS-414-1 ..... N81-14320*
US-PATENT-CLASS-423-648R N81-14103*
US-PATENT-CLASS-424-274 ..... N81-14613*
US-PATENT-CLASS-427-385.5 ..... N81-14078*
US-PATENT-CLASS-427-429 ..... N81-14078*
US-PATENT-CLASS-428-113 ..... N81-14000*
US-PATENT-CLASS-428-114 ..... N81-13999*
US-PATENT-CLASS-428-114 ..... N81-14000*
US-PATENT-CLASS-428-140 ..... N81-14000*
US-PATENT-CLASS-428-413 ..... N81-14000*
US-PATENT-CLASS-428-473.5 ..... N81-14078*
US-PATENT-CLASS-428-480 ..... N81-14000*
US-PATENT-CLASS-428-528 ..... N81-13999*
US-PATENT-CLASS-428-541 ..... N81-13999*
US-PATENT-CLASS-428-902 ..... N81-14000*
US-PATENT-CLASS-428-921 ..... N81-13999*
US-PATENT-CLASS-455-51 ..... N81-14186*
US-PATENT-CLASS-455-71 ..... N81-14186*
US-PATENT-CLASS-455-619 ..... N81-14186*
US-PATENT-CLASS-521-27 ..... N81-14076*
US-PATENT-CLASS-521-32 ..... N81-14076*
US-PATENT-CLASS-521-62 ..... N81-14076*
US-PATENT-CLASS-528-362 ..... N81-14016*
US-PATENT-CLASS-528-401 ..... N81-14016*
US-PATENT-CLASS-528-422 ..... N81-14016*
US-PATENT-4,032,089 ..... N81-14077*
US-PATENT-4,077,788 ..... N81-14103*
US-PATENT-4,119,581 ..... N81-14076*
US-PATENT-4,166,170 ..... N81-14078*
US-PATENT-4,193,827 ..... N81-14103*
US-PATENT-4,209,561 ..... N81-13999*
US-PATENT-4,212,297 ..... N81-14605*
US-PATENT-4,218,685 ..... N81-14187*
US-PATENT-4,218,892 ..... N81-14287*
US-PATENT-4,218,941 ..... N81-14319*
US-PATENT-4,219,027 ..... N81-14612*
US-PATENT-4,219,084 ..... N81-14137*
US-PATENT-4,219,171 ..... N81-14320*
US-PATENT-4,219,926 ..... N81-14389*
US-PATENT-4,222,098 ..... N81-14220*
US-PATENT-4,225,372 ..... N81-14077*
US-PATENT-4,228,422 ..... N81-14221*
US-PATENT-4,228,656 ..... N81-14318*
US-PATENT-4,229,196 ..... N81-14103*
US-PATENT-4,229,473 ..... N81-14000*
US-PATENT-4,230,717 ..... N81-14613*
US-PATENT-4,233,258 ..... N81-14078*
US-PATENT-4,233,606 ..... N81-14185*
US-PATENT-4,234,258 ..... N81-14015*
US-PATENT-4,234,715 ..... N81-14016*
US-PATENT-4,234,971 ..... N81-14186*
US-PATENT-4,235,060 ..... N81-14317*

USAAVRADCOM-TR-80-D-18 ..... N81-13965 #
USAAVRADCOM-TR-80-F-9 ..... N81-14324 #

USAFA-TR-80-16-VOL-1 ..... N81-14637 #
USAFA-TR-80-16-VOL-2 ..... N81-14638 #
USAFA-TR-80-19 ..... N81-14619 #

USGS/WRD/WRI-80/047 ..... N81-14604 #

USGS/WRI-80/42 ..... N81-14604 #

USNA-TSPR-107 ..... N81-14838 #

VITRO/JOB-03021-03540 ..... N81-13949 #

VPI-AERO-101 ..... N81-14284 #

VTH-LR-292 ..... N81-13951 #
VTH-LR-296 ..... N81-14373 #
VTH-LR-298 ..... N81-14194 #

VTH-M-366 ..... N81-14104 #

WFPS-TME-79-033 ..... N81-14871 #

WHOI-80-35 ..... N81-14551 #

WISP-80 ..... N81-14953*#
WISP-336 ..... N81-14953*#

WP-3-80-81 ..... N81-14916 #
WP-9-80-81 ..... N81-14768 #

WSRL-0171-TM ..... N81-14575 #

WTHD-120 ..... N81-14027 #
WTHD-125 ..... N81-14352 #

WUTA-7972-04 ..... N81-14357 #

W80-06436 ..... N81-14934 #
W80-06453 ..... N81-14384 #
W80-06508 ..... N81-14524 #

Y-2209 ..... N81-14180 #

PUBLIC COLLECTIONS OF NASA DOCUMENTS

DOMESTIC

NASA distributes its technical documents and bibliographic tools to eleven special libraries located in the organizations listed below. Each library is prepared to furnish the public such services as reference assistance, interlibrary loans, photocopy service, and assistance in obtaining copies of NASA documents for retention.

CALIFORNIA
University of California, Berkeley
COLORADO
University of Colorado, Boulder
DISTRICT OF COLUMBIA
Library of Congress
GEORGIA
Georgia Institute of Technology, Atlanta
ILLINOIS
The John Crerar Library, Chicago
MASSACHUSETTS
Massachusetts Institute of Technology, Cambridge
MISSOURI
Linda Hall Library, Kansas City
NEW YORK
Columbia University, New York
OKLAHOMA
University of Oklahoma, Bizzell Library
PENNSYLVANIA
Carnegie Library of Pittsburgh
WASHINGTON
University of Washington, Seattle

NASA publications (those indicated by an "*" following the accession number) are also received by the following public and free libraries:

CALIFORNIA
Los Angeles Public Library
San Diego Public Library
COLORADO
Denver Public Library
CONNECTICUT
Hartford Public Library
MARYLAND
Enoch Pratt Free Library, Baltimore
MASSACHUSETTS
Boston Public Library
MICHIGAN
Detroit Public Library
MINNESOTA
Minneapolis Public Library
MISSOURI
Kansas City Public Library
St. Louis Public Library
NEW JERSEY
Trenton Public Library
NEW YORK
Brooklyn Public Library
Buffalo and Erie County Public Library
Rochester Public Library
New York Public Library
OHIO
Akron Public Library
Cincinnati Public Library
Cleveland Public Library
Dayton Public Library
Toledo Public Library
TENNESSEE
Memphis Public Library
TEXAS
Dallas Public Library
Fort Worth Public Library
WASHINGTON
Seattle Public Library
WISCONSIN
Milwaukee Public Library

An extensive collection of NASA and NASA-sponsored documents and aerospace publications available to the public for reference purposes is maintained by the American Institute of Aeronautics and Astronautics, Technical Information Service, 555 West 57th Street, 12th Floor, New York, New York 10019.

EUROPEAN

An extensive collection of NASA and NASA-sponsored publications is maintained by the British Library Lending Division, Boston Spa, Wetherby, Yorkshire, England. By virtue of arrangements other than with NASA, the British Library Lending Division also has available many of the non-NASA publications cited in *STAR*. European requesters may purchase facsimile copy of microfiche of NASA and NASA-sponsored documents, those identified by both the symbols "#" and "*", from: ESA - Information Retrieval Service, European Space Agency, 8-10 rue Mario-Nikis, 75738 Paris CEDEX 15, France.

National Aeronautics and
Space Administration

Washington, D.C.
20546

Official Business
Penalty for Private Use $300

SPECIAL FOURTH CLASS MAIL
Book

Postage and Fees Paid
National Aeronautics and
Space Administration
NASA-451

U.S.MAIL

POSTMASTER: If undeliverable (Section 158
Postal Manual) Do Not Return